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EDITORIAL NOTES—GAS, &c.

The Midland Meeting—Carbonization Questions.

THE address of the new President of the Midland Association of Gas Managers, Mr. Harold E. Copp, was of ample scope. It was a comprehensive confession and exposition of the professional faith within him. Every observant gas manager in his work travels far and travels wide; and the President has done so. Though in various places in the address and his reply to the richly deserved vote of thanks, he traduced his own experience by reference to his somewhat short professional life compared with many others present, the manifold interest found in the address enables one to write "it is well," and to look forward to Mr. Copp's professional career with no manner of misgiving. He takes a broad view of the affairs of the industry, and of the daily workings, which is another way of saying that he is no bigot. He presents his views without dogmatism, but with the positive knowledge that what he states has been born and established by personal investigation. A routine daily practice in technical work is not good enough without frequent inquiry to see that, under new lights, it cannot be improved; and at West Bromwich, Mr. Copp has had excellent opportunities of testing and varying his practice to, as he shows, good purpose. The teachings of such an inquiring mind directed to the art and science of gas manufacture can lead in these times to but the one conclusion, that it is "only by improved education and sound practical training "that the status of the gas engineering profession can be "raised." That is the President's openly expressed belief; and the belief is a sound one. The union of improved education and practical training must—there can be no question about it—materially influence progress and individual capacity.

The President drew attention to the wiles of competitors, and to the ascertained costs of generating electricity per unit, on light and heavy loads, by private installations of plant worked by town gas and suction gas, which showed that at figures below 2s. the former works out the cheaper. But he did not explain that the figures refer only to units of plant of under 100-horse power. Notwithstanding the useful figures that he quotes under this head, which figures have before been treated upon in the "JOURNAL" (*ante*, p. 215), and notwithstanding the good showing they make, there is now reason for regarding private power-gas plants as greater competitors than distributed power gas. As a financial and technical success, distributed power gas has receded almost into the oblivion that sooner or later overtakes most mundane failures. As neighbours, the large power-gas generating plants are relegated by the people of Tipton to the ranks of the undesirables; for, if report be true that reaches us from Tipton, no one will question a complete compliance there with the requirements of the Act of Parliament that distributed power gas shall possess a distinctive and readily perceptible smell. Among his sundry introductory topics, the President presented a good case for all associated with the industry to take up a stronger protective attitude by union. He did not say this in as few words; but he did concede that gratitude was due to the London Gas Companies for the battles fought in the immediate past on behalf of the whole gas industry, and confessed to the little done by the Provinces in assisting in these matters. He pointed, too, to the threatenings of a perpetual increased price for coal if the Miners' Eight-Hours Bill passes; and it is quite clear that he sides with the view that has been consistently taken in these pages that the cataclysm of labour, burdensome, and confiscatory legislation, which at present shows no signs of subsiding, but rather the reverse, will in its cumulative injury so affect industry, if there is not an early stoppage, that the greatest sufferers will be those whom the ill-conceived measures are designed to chiefly benefit.

From general to technical subjects. The President has renounced auto-carburation of blue water gas by passing it through coal gas retorts; and he presents much that is of interest on the subject of the independent enrichment of the water gas by benzol or oil gas. If it is calorific value as well as illuminating power with which it is desired to fatten the gas, then oil gas is the better enriching medium; if it is illuminating power only, then benzol is found the cheaper. Carbonization, however, is the technical question of the day; and with every renewal of discussion, the phenomena of the subject appear to become magnified afresh. The President treated of the topic in his address; and Mr. Fletcher W. Stevenson opened a discussion on the general subject of stoking machinery, which carried the members into a consideration of the influences of the various types of machinery on results. Experiences are almost bewildering in their conflicting diversity; and he would indeed be a clever man who could educe from accumulated achievement a combination of method, and avow it to be an unimpeachable perfection from the standpoint of present-day knowledge. One man clings to old methods; another goes over tentatively, perhaps boldly, to the newer practices. Mr. R. O. Paterson has up to the present been satisfied with the manual machine for charging his retorts; and in a new retort installation he is only going to supplant the man at the end of the scoop by mechanical means of performing the same operation. And why? Because steadfast conservative that he is, he believes in light charges and short-hour carbonization; by which rules, combined with the use of high-class coal, and (we think he would claim) the abandonment in his working of the hydraulic main, he, as is notorious, obtains excellent carbonization results. Before cost he places the object of carbonization, and therefore of production result. But there must be a point in every case in carbonizing result and in carbonizing costs where the two meet, and mark the maximum economy and advantage for both producer and up-to-date consumer. That junction in advantage is the objective of every investigating engineer in the present day. The President has adopted the De Brouwer machine in place of manual stoking machines; Mr. Stevenson is installing the Fiddes-Aldridge machine; while other contributing members to Thursday's proceedings are adhering to the older types of machines. The most suitable is all a question of individual circumstance, and not of published cost under perhaps totally different circumstances. On such costs, little reliance can be placed without a full knowledge of the conditions under which the work is done, and of the items that constitute the total, due regard being also paid to the capital and maintenance charges. All sorts of working costs were quoted in the discussion—ranging from 2s. 2d. to 10½d. per ton; but what do they include, and are the machines favoured with the necessary scope to show their maximum ability in reducing cost. Without such information, engineers have no ready means of estimating the value of the figures, or of utilizing them in arriving at a proper decision.

From the maxim of light charges and short-duration carbonization, engineers are steadily dropping away. The necessity for the higher illuminating powers having succumbed to scientific progress, and the never-ceasing quest for a reduction of labour costs, have produced an almost common abandonment of the quondam time-honoured principle; and the De Brouwer and similar projectors have hastened the change. With projected light charges, the *bête noire* of stopped pipes came along with vexing and perplexingly greater frequency. And why, has not yet been satisfactorily explained. But all along the line there now comes the testimony that, by increasing the weight of the projected charges to 8½ or 9 cwt., and prolonging the duration of carbonization to eight hours, all difficulty with stoppages has ceased, the coke is of improved quality, and the character of the tar is somewhat altered. The President ventures an explanation of the relief from the stopped-pipe nuisance; and it is that, with the heavier charges, the gas produced at all periods contains some proportion of light oil vapours, and so do not extract the liquid hydrocarbons

in the tar adhering to the inner surface of the ascension-pipes. He has come to this conclusion by testing the temperatures in the ascension-pipes, and by common-sense reasoning. But the point is certainly worth more particular and precise inquiry. There is, however, another side to this question of the heavier charge and longer carbonization period; and that is its effect on the production of gas per mouthpiece. So working, Mr. J. Ferguson Bell speaks of a production of only 5500 cubic feet—the production of the primitive direct-fired setting—per mouthpiece; while the President says the production per mouthpiece "is not "seriously diminished," which is an admission of a diminution. On the other hand, Mr. Paterson and Mr. Langford, with manual stoking machinery, are getting the more approved 8000 to 9000 cubic feet of gas per mouthpiece. From 8000 and 9000 cubic feet to 5500 cubic feet is a serious drop; and with such a decline, the question of capital costs and production per given area of ground space comes into view somewhat unpleasantly. The heavier charge suggests to Mr. Bell that, if horizontal retorts are filled, almost the same results should be obtained as from vertical retorts—of ordinary form, not those aiming at continuous carbonization. We are afraid Mr. Bell would find serious difficulties if he ventured to "fill" his horizontal retorts; but the free space may perhaps be reduced with advantage. That is another matter. But the "filling" of retorts must, we think he will eventually conclude, be left to those set vertically or on the incline as in the case of Mr. Love's installation at the Guildford Gas-Works. While, however, experience is not yet sufficiently conclusive for a balance to be struck between the advantages and the disadvantages of the heavier charges in horizontal retorts that have come in with the projectors, there is the consideration as to whether these projectors have not opened up the possibility of a complete revolution in the system of carbonizing in gas-works. The idea is Mr. Thomas Glover's; and he is completing an installation of retorts at Norwich which will carry one ton charges of 3 feet deep and 12 inches wide. The results from the carbonizing chambers at the Munich Gas-Works have not been very encouraging in the matter of carbonizing in greater bulk. But Munich practice in this regard has not struck all engineers as being the best possible; and Mr. Glover is proceeding hopefully. The working information that he promises the gas industry in due season, whatever the result may be, will be awaited with unbounded curiosity.

Incidental reference was made in the discussion to the vertical retort; and while speaking of heavier changes, it is not out of place to call attention to a statement (which has not been particularly marked) made by Mr. Duckham in the notes on the Woodall-Duckham system presented to the Manchester Institution on their visit to Liverpool towards the close of last year. It was to the effect that, in the continuously working retorts, with the new discharging arrangement, at the Poole works of the Bournemouth Gas and Water Company, each retort (we take it of 25 feet length) was carbonizing 64 cwt. of coal per day; and it is calculated that at this rate of working, the quantity of coal that could be dealt with by four of these retorts would exceed that of ten 4-metre retorts on the Dessau system. The desire for personal investigation into the vertical retort is spreading; and week by week, we hear of pilgrimages of gas engineers to Germany to see and to inquire into the working of the principal installations on the Dessau system. But, like Mr. Stevenson and Mr. Bell, British engineers are holding back. Still experience under British conditions would not be a bad thing; and competition has a stimulating usefulness. Therefore, we shall welcome the early announcement that some British engineer has dropped the attitude of caution, and sunk incomplete satisfaction, and has boldly decided to erect a bench of the Dessau retorts in this country.

Manchester Institution Meeting.

It was a voluminous address with which Mr. T. Duxbury, of Oldham, inaugurated his year of office last Saturday as President of the Manchester Institution of Gas Engineers. Its very extent and the variety of theme defy comment on the whole. In it he eschews theory, and treats throughout of his many subjects on a base that is exclusively practical. This being so, we can commend the address to all and sundry who desire exact information of experiences as obtained under the conditions of gas making in such a severely business and manufacturing centre as Oldham. The advances of method in gas manufacture have been as freely applied there as opportunity would allow since the President has been the Engineer; and, when a man who has been responsible for change does as Mr. Duxbury has done in his address, set out item by item the costs and the results of working under the altered circumstances, and they prove economy, and so fully justify his recommendations, they have a silencing effect on would-be adverse critics, and the comment can only be that of unfeigned praise.

It is not singular that carbonization, in view of present-day activity in this direction, takes a prominent place in the address; and what the President has to say offers a useful supplement to the presidential remarks and the discussion on the subject of stoking machinery and carbonization at the Midland meeting. Here Mr. Duxbury is able to give data as to working, under nearly corresponding conditions, for hand-worked direct-fired settings, and regenerative settings with separate compressed-air charging and drawing machines of the West type, and also of compressed-air combined machines, and, for one house using the latter machines, he sets out the differences in costs per ton of coal in working sixteen settings and only half that number. When the whole sixteen settings, carbonizing 192 tons of coal, are in use, the wages costs amount to 12·28d. per ton; and including interest on machines, compressor, conveyors, and boilers, fuel, oil, and waste, and wear and tear, the cost is brought up to 16·48d. With eight through retorts only, the respective figures are 13·42d. and 18·58d. But of greater interest than the effect on costs of scope for machines and men are the, under the comparable conditions of the Oldham works, relative figures for the separate compressed-air drawing and charging machines and the combined machines, dealing with the same number of mouthpieces and the same weight of coal. The respective labour costs are 7·8d. and 5·9d. per ton of coal carbonized—a saving by the combined machine of 1·9d. per ton, due entirely to the dual operations of drawing and charging being performed and under the control of one man. Again, in the removal of hot coke, the supersession by coke-conveyors of tippler trucks and rails and of the primitive method of barrow work is justified by the very definite and substantial savings shown in the address. The bad name that the original forms of coke-conveyors obtained as producers of breeze is being gradually wiped out by the more modern experience, and by the improved methods of dealing with the coke after it leaves the retort-house. The old plan of dropping coke from a height for stacking purposes instead of into overhead hoppers, or by making provision for the easy descent of the coke without rough treatment, is fast disappearing, and with it the unconscionable amount of breeze. There can be little complaint about a conveyor travelling, as does one at Oldham, a distance of 150 feet, and depositing its burden of coke into overhead hoppers, that produces only $\frac{1}{2}$ per cent. more breeze (tested by a $\frac{3}{4}$-inch mesh) than was formerly done by the tippler trucks, and precisely the same amount when tested by a $\frac{1}{2}$-inch mesh. This experience confirms the special investigations of Herr Körting into this question. Though more expensive in construction, the President's experience is converting him to favour brick retorts against fire-clay ones; and there are several gas engineers in the country who, with records of great longevity for brick-built retorts, and considerable experience of their facile repair, will rank themselves with him. But ease of repair and longevity and the greater cost are not the sum-total of the *pros* and *cons* in this particular matter; and it would have been interesting if the President had included some information as to the comparative fuel accounts with his brick and ordinary fire-clay retorts.

In this veritable mine of statistical wealth that the President opens up, the capital and working cost savings realized by installing in purifiers Jäger or hurdle grids are well treated upon; and the comprehensive and comparative data he gives of manufacturing carburetted water gas and coal gas at Oldham will be consulted with peculiar interest in view of their detailed character. It will not escape observation that the figures are for the year ending March, 1907, when fairly normal prices prevailed. Oil was then only 3d. and coke is charged at 7s. 6d.; and the total cost (including interest and sinking fund) is for 23·5-candle carburetted water gas 18·52d. per 1000 cubic feet, while the corresponding figure (less residuals) of 20-candle gas into the holder is 12·038d. We should like to see the figures put in contrast for the current year with oil, coke, and coal at the higher market prices. Whatever, however, the figures work out to comparatively, in an industrial district such as that at

Oldham, the carburetted water-gas plant is an indispensable adjunct, if only to meet the unexpected flights of demand by the mills. As a set-off to the relatively higher cost of the carburetted water gas, Mr. Duxbury calculates that, by its manufacture, the price of coke has been increased by over 2s. a ton. If this is so, is the 7s. 6d. charged to the water-gas plant for coke the price that was procurable outside for coke, or the price that would have obtained had the plant not been in operation? However, the appeal the President makes for combination among coke producers, so as to relieve the coke market from the depression of prices by buyers, is one that is worthy of serious consideration. But for the largest undertakings, with immense outputs, the question is a two-sided one. A combination in which they took part might assist in the regulation of prices, but it might also have the effect of curtailing their own field for business; and as large producers they cannot afford in any way to induce a limitation by any voluntary action. Our sympathies, however, are completely on the side of the weaker, and therefore the smaller, producers, who are usually those with a poor local market; but the sale of coke, like coal, must always be the subject of competition. We can quite recognize, however, that the presence in the District Association Commercial Sections of the larger producers for the general discussion of trading topics, and for common action in certain ways, would be mutually beneficial, just as the Sulphate of Ammonia Committee is to the producers of sulphate.

There is encouragement in what the President puts forward in his address as to the superiority, in cost per brake horse power, of 2s. town gas in competition with suction gas. But it depends largely on load and other factors whether this is so. Taking all in all, we are in total accord with him; but, from the competition point of view, there are, we fear, holes in his bucket. At the outset of his remarks under this head, he puts forward the most awkward point with which gas suppliers have to deal in this matter. Last year, he interviewed "several" suction-gas users, in order to ascertain their costs. Mark the term "several" in connection with what follows: "Nobody seems to keep an exact "record of every item of cost—in fact, it does not seem to "be known what it really does cost." And what is more, manufacturers do not trouble about the matter at all. They do not look at the question critically. The costs of a suction gas plant are spread over so many separate accounts, that the manufacturer is deceived as to the actual cost to him, while the account for coal gas is an inclusive one for all comprised in the suction-gas generating plant. The President gives an "estimate" of the cost of suction gas with a plant in actual work in the past twelve months. He takes anthracite at 34s. a ton, which, though admittedly anthracite has gone up largely in price, is not a normal figure. The charge of 1s. 2d. per 1000 gallons for town water for industrial purposes is not a common one. Labour with a suction-gas plant should, of course, be included; but more often than not the suction-gas plant is put under the care of the machine attendant or a works' handy man without any real additional charge for labour being incurred by the manufacturer. These points are being made not in any hypercritical spirit, but to show that the President's estimate can only apply to a certain time and to certain circumstances, and that it would not, under all conditions, and under conditions within our own knowledge, satisfy the manufacturer that he would be in any way gaining by using 2s. town gas instead of suction gas. The 2s. gas might satisfy a man who could be induced to look at the question broadly; but it obviously has not satisfied those "several "suction-gas users" whom the President interviewed. An important point in this connection had prominence given it by Mr. Duxbury. Sewers have ordinarily to bear quite enough censure; but it is hard on the sewers when blame is put upon them for the effluvium given off by some foreign substance or fluid. A considerable quantity of effluent water is discharged into drains and public sewers by these suction-gas plants; and the water, having been used for washing the gas, contains traces of sulphuretted hydrogen, and gives off an unpleasant smell. We have not heard of any serious complaints from this; but perhaps our sanitary authorities have not yet awakened to the fact that a new contributory source of nuisance has arisen in their midst.

There were two papers prepared for the meeting—one by Mr. Thomas Newbigging, which contained warning for gas managements against too rapid flights downwards in illuminating power, and the other (which was not read) was by Mr. E. Frith, of Runcorn, on the construction and costs of a concrete gasholder tank. We must defer reference to Mr. Newbigging's paper; and as to Mr. Frith's, it is an excellent account, useful for future reference, of a good and cheap piece of work. A concrete tank, of 106 feet diameter and 30 feet deep, that only cost £6 2s. 8d. per 1000 cubic feet of tank capacity is economical construction, considering that not many years ago £9 or £10 were considered notably low figures.

The Oneness of the Gas Industry.

"Why am I here?" asks Sir George Livesey in the opening lines of the address that he delivered last Wednesday to the members of the Society of British Gas Industries on taking the presidential chair in succession to Mr. Dugald Clerk. He gives excellent reasons, but they do not cover all. He accepted the invitation to the presidency because he approves of the formation of the Society, and because he believes it will be of advantage to the gas industry generally, and have a beneficial effect on industrial and trading relations. The serious activity of the members since the formation of the Society gives material support to Sir George's views. But there are other reasons why it is meet that Sir George should be in the chair of this Society. The gas industry is somewhat different from most other industries. It is an industry in which one section, and this the greater section, puts down extensive plants for the production and sale of a commodity; while the other section largely supplies and builds the plant required for production and manufactures the appliances by which the commodity is utilized to the best advantage. The measure of success of the one section in developing the use of the commodity correspondingly affects the prosperity of the other; and the success of the latter section in producing new appliances and improvement in efficiency aids and strengthens the supply industry in prosecuting development and in meeting competition. "Buyers and sellers" was the title given by Sir George to his address; but the two sections stand in closer relationship than mere vendors and purchasers. Their interests are so interwoven that no line can be possibly drawn between them. Their union is something that is actual and material. Therefore, apart from his conspicuous personal qualifications, the presidency of Sir George in the Society is quite in accord with the fitness of things. What he has done as a gas administrator, as a gas engineer, as a designer and improver of plant, has conferred large and lasting benefits on the gas-supply and plant and appliance industries; and consequently, from all points of view, the answer to his inquiry, "Why am I here?" is completely satisfied. His presence in the chair, indeed, brought into relief in a striking manner the fundamental indivisibility of the sections of the industry.

The subject-matter of the address was characteristic of Sir George; and the address alone would have been a sufficient justification of his presence in the chair of such a Society. The true principles of business are precisely those that should animate us in our conduct in private life, and those which are productive of act and result of which no individual has need to be ashamed. Sir George spoke of these things, and spoke wisely and well. But he would not have it that high ideals for business conduct are for the sellers only, and not for the buyers. The high ideals of the one should be the ideals of the other. There is in most things room for improvement. In the relations of buyers and sellers, there is plenty of scope for improvement; and it would be possible to bring it about, without the intervention of the Legislature or of the Law, if all were swayed by the ethical wisdom found in the address. The Society of which Sir George is the President has among its objects the advancement of fair trading; and therefore the address was appropriate both in time and place. Naturally, the President could not altogether avoid the subject which has given him the greatest pleasure in his professional and working life—that is to say, co-partnership. There are difficulties (he sees them, and the members of the Society know of their existence) in the way of applying the system to businesses in which there is irregularity in demand and consequently of supply. There are also the difficulties of Trade Unions and suspicion; but Sir George has himself shown that Trade Unions and suspicion are not beyond the assuaging influences of courage and patience. He is therefore not content to think offhand that the benefits of co-partnership are not for the ordinary manufacturer and his employees; but he takes

no absolute stand in the matter. But now that he has discussed the question with representative manufacturers, sufficient is known of him to say that his mind will further revolve it before he finally agrees that the difficulties are unconquerable. It may be mentioned here that in addition to the Leamington and Walker and Wallsend Gas Companies, the Rugby Company have definitely entered the co-partnership ranks. The cause is gaining in influential adherents.

Commercial Gas Company's Meeting.

TWELVE months ago the directions of gas undertakings were contemplating a year in which the financial results of the trading, even taking into calculation the possible larger returns from residuals and increased business in gas, would fall somewhat short in profit. It was a sensible and cautious view; and, as a consequence, the profit realization, having largely exceeded anticipation, has come in most cases as a pleasant surprise, more especially as the abnormally fine weather of the latter part of the year—the few short spells of dense fog notwithstanding—had a bad effect on the consumption of gas. Even as recently as last August, the Chairman of the Commercial Gas Company (Mr. W. G. Bradshaw), forecasting the position of affairs, expected that the December half-year's profits would be inadequate, though supported by a penny increase in price, to meet dividend and interest; but, in the event, not only have the profits yielded sufficient to meet dividend and interest obligations, but the carry-forward has been augmented by some £2300. The variations up and down of expenditure and revenue, showing how this has been for the most part accomplished, were fully explained by the Chairman in his speech to the proprietors last Thursday; but contributing to the result is the material improvement shown by the manufacturing returns. The promise made, six months ago, by the Engineer (Mr. Stanley H. Jones), on behalf of his staff and men, that they would strain every nerve to ameliorate the pressure of the dearer prices of materials, has been amply fulfilled; and we have no doubt that they will see to it that they do not recede, given coal of equal quality, from the average production of 11,246 cubic feet of gas per ton of coal carbonized that was attained last half year.

It is somewhat remarkable how close the percentage increase in gas consumption in the three districts of the Metropolitan Companies came out during the six months. The Gaslight and Coke Company had an increase of 1 per cent.; the South Metropolitan Company, of 1·36 per cent.; and the Commercial Company, of 0·83 per cent. Mr. Bradshaw drew attention in his speech to the fact that, in the first three months of the half year, the sales showed a 5 per cent. increase on the corresponding period of the preceding year; while the second three months exhibited a falling off of nearly 2 per cent.—the final result being the increase of 0·83 per cent. The figures Mr. Bradshaw gave are interesting, as indicating the changed character of the gas business and the modern effects of seasons upon the business. A 5 per cent. increase in the three summer months indicates the growing demand for gas for cooking purposes; and the falling off in the three winter months, the effects of incandescent gas lighting and the diminution caused by extraordinarily mild weather in the use of gas-heating appliances. The snaps of cold weather that we have been experiencing the last two months, and their stimulating effects for the time being on consumption, have confirmed the view as to the important factor that temperature is in the fortunes of the gas industry.

Mr. Bradshaw dealt in his speech with the causes, as mirrored in the trade returns, of the high price of coal last year; but the future is of greater concern than the past, now that the temporary revellings in trade prosperity have come to an end. Mr. Bradshaw sees nothing, except the imbecile attempt to regulate by statute the working capacity and earning power of the miners, to retard the drop in coal prices. But the outlook of the current six months must not be regarded as being otherwise cloudless. Dear coal will still be in use; and the reverse of what happened in the first six months of last year will in all probability be the experience of part of the present half year. Then cheaper coal under running contracts was being used; but coke followed coal in its upward course. This half year the expensive coal under running contracts will be in use; with the fall of coal prices, the market value of coke will also descend.

Annual Meeting of the Institution of Gas Engineers.

Just before going to press yesterday, we received from the Secretary of the Institution (Mr. Walter T. Dunn) a preliminary announcement as to the arrangements for the annual general meeting to be held in London from Tuesday, June 16, to the following Friday. The Council of the Institution of Mechanical Engineers have again kindly granted permission for the meeting to be held in their lecture theatre at Storey's Gate. Two sittings will be devoted to business there. Mr. W. Doig Gibb, M.Inst.C.E., of Newcastle-upon-Tyne, will deliver his presidential address, and papers will be read and discussed. The further proceedings will be transferred on Thursday to the Franco-British Exhibition at Shepherd's Bush; and a special inspection is being arranged, to include, of course, the Gas Section. The President and Mrs. Gibb propose to issue invitations to a reception, and arrangements will be made for an excursion on the Friday. On both these occasions, ladies will be invited. The members will hear with satisfaction that it is expected the railway companies throughout the United Kingdom will again grant to those attending the meeting the privilege of tickets at the rate of fare-and-a-quarter for the double journey on payment at time of booking.

The Benevolent Fund.

In making the above announcements, Mr. Dunn asks the kindly consideration of members to the Institution's Benevolent Fund. It is not a matter to be contemplated with anything but regret that there are only 126 subscribers out of a membership of above 800, nor to hear that the receipts last year fell short of the expenditure by the amount of £13 13s. 9d. The sum disbursed in relief was £224 10s. The names of new subscribers will be gladly received; and we do most earnestly appeal to members to wipe out the disgrace of negligence and thoughtlessness in this matter. It is nothing more than that. The members of the gas profession are not less charitably inclined than the rest of the community. Mr. Charles Meiklejohn has found all this out in reopening the subject in connection with the Midland Association, which body, on his motion, has just voted 25 guineas to the fund, and he has obtained fifteen new subscribers from among the members, and has good hope of securing more. Personal effort of this kind, he finds, meets with a greater reward than printed circulars. The reference to the matter towards the end of the proceedings at the Midland meeting should be read.

Insurance Under the Compensation Act.

The Committee appointed by the Council of the Institution of Gas Engineers to consider and report upon the question of insurance of gas-works employees under the Compensation Act, 1906, have gone into their work most thoroughly, and (as will be seen elsewhere) have issued a report full of discussable suggestion. The Committee do not appear to have met with the most courteous treatment at the hands of the Accident Offices Association, whose dilly-dallying procedure in this instance is not worth converting into a rule of business. The Association, however, when eventually they applied themselves to this apparently (from their standpoint) unimportant question of the insurance of the army of employees of the gas industry, stated in effect that the industry has not much ground for objection to the high rates of insurance proposed by the insurance offices. That is a matter of opinion upon which there is distinct disinclination in the gas industry to agree with the Accident Offices Association, of which it transpires the insurance offices asking the highest rates are connected. The Institution Committee seeing no chance *viâ* the Accident Offices Association to secure any advantage for gas undertakings went completely into the question of a mutual insurance scheme, taking legal advice, and discussing the methods by which such a project could be carried out. But seeing that they do not make any concrete recommendation on the subject, it is clear they are not themselves enamoured of the idea. They present all the knowledge gained in readable and suggestive form, and no doubt will be very glad to see any discussion of the subject by "JOURNAL" readers. That they are unfavourable to the scheme is further apparent from their opinion that all, except the smaller undertakings, would do well to insure against accidents by setting aside a sum out of profits every year equal to that asked for by the Insurance Companies. Such a fund, it is believed, would be sufficient to meet liabilities, and the yearly contributions could be

varied as found necessary; or, as an alternative, and more particularly in the case of small undertakings, the Committee are of opinion that it would be well to adopt the principle of a modified scheme of insurance, whereby the insurance would only be against fatal accidents and accidents causing permanent incapacity.

Gas Progress in the North-East of England.

The proceedings at the annual meetings of the two of the largest Gas Companies in the North-East of England—those supplying the districts of North and South Shields—which are reported in another part of the "JOURNAL," are of unusual interest in several respects. The Tynemouth Gas Company have been in existence for within a few years of half-a-century; and the Chairman—Mr. J. B. Williamson—has occupied a seat on the Board during what may be called the progressive moiety of that period. Glancing back over the two decades which have elapsed since he became a Director in 1887, and reflecting upon the changed conditions of gas supply now as compared with that time, it was not unnatural that he should have indulged in retrospect at the meeting over which he presided, and should have presented to the shareholders some statistical details to show how much the undertaking had advanced. When Mr. Williamson joined the Board, the gas consumption for other than lighting purposes was practically, as he said, a "negligible quantity" in Tynemouth; the result being that the plant was idle, and consequently unproductive, in the daytime and during the summer months. The great increase in the demand for gas for cooking and heating, as the result of the development of this branch of the Company's business and the introduction of prepayment meters, has brought about a more even distribution of the make of gas throughout the year, and rendered possible a larger return than formerly upon the capital invested. In the period under review, the bulk of coal dealt with increased 124 per cent., and the production of gas 162 per cent.; the make of gas per ton rising from 10,350 cubic feet in 1887 to 10,794 cubic feet last year, and the quantity sold from 9032 to 10,095 cubic feet. Further evidence of progress was afforded by the figures cited by the Chairman in regard to residuals. In 1887, the Company paid £5808 for coals and received back £3256, or 56 per cent., for bye-products. Last year the coal bill came to £25,474, and the returns for residuals were £20,433, or 80 per cent. of the outlay on raw material. These improved yields, in the face of greatly enhanced coal prices, had only been made possible, as Mr. Williamson was careful to point out, by the adoption of modern methods of manufacture, especially in the new works opened in 1903. These, it may be remembered, were designed and carried out by Mr. A. Clement Hovey, the Assistant-Engineer, who is now Engineer-in-Chief at Milan; and a pleasant feature of the meeting was the recognition of his services to the Company by the presentation to him of an illuminated address and a silver tea and coffee service, which were accepted on his behalf by his former chief, Mr. William Hardie. At the meeting of the South Shields Company on Friday, Dr. Armstrong had to present a very favourable report on the working of the Company last year. The quantity of gas sold realized £3368 more than in the preceding twelve months; and £4867 more was obtained for coke. The sale of gas was the largest on record; and the percentage increase the highest for the past ten years. The Directors and their Engineer (Mr. T. H. Duxbury) are closely watching every new development in the distillation of coal; and they hope to have eventually the most modern and economical plant erected at their Jarrow works, with which the name of their former Engineer, Mr. W. J. Warner, whose recent decease was noticed in the "JOURNAL" last week, will always be closely associated. Dr. Armstrong acknowledged the excellent services rendered by the Secretary (Mr. J. H. Penney), Mr. Duxbury, and the staff; and notwithstanding the uncertain condition of the coal market, he expressed confidence in the position of the Company.

A Recognition of Good Service.

Shareholders in the Exeter Gas Company have every reason to congratulate themselves on the success of the forward policy pursued by the Directors. As in the case of most other gas undertakings, the Company have had of late to meet competition of a rather severe kind, and not always quite fair. They have, however, not "taken it lying down." On the contrary, every fresh aggression of the municipal electric lighting undertaking has spurred the Directors to new efforts. No means have been spared to bring the merits of gas for lighting and heating under the notice of the public; and there can be no doubt that much advantage has accrued to the Company from systematic and skilful advertising. If electric lighting has made headway in Exeter, it is to a large extent because it is fostered and protected by the City Council, the members of which are imbued with the idea that it is their duty to make the undertaking "pay," even if the ratepayers are mulcted in several hundred pounds a year for the cost of lighting which could be better done by gas. Deprived in this way of some of their old sources of revenue, the Company have wisely extended their borders, and carried their mains into the growing suburbs of Ide and Alphington. Though time is needed for the development of new business, this experiment has already borne fruit, and gives promise of future increase. The Company have also achieved success in the lighting by incandescent burners of such of the city streets as are left to them. In other directions the business shows substantial growth; and the fact that the Directors are able to reduce the price of gas by 2d. per 1000 cubic feet in these days of dear coal, is striking evidence that the undertaking is in a healthy and prosperous state. No small part of the credit for this is due to Mr. W. A. Padfield, who, in the position of Engineer, Manager, and Secretary, has done much to promote the development of the Company, and has now the satisfaction of seeing it attain a position of apparently unassailable strength. The suggestion, made by one of the shareholders, and unanimously endorsed by the meeting last week, that Mr. Padfield's services should be recognized by his appointment to a vacant seat on the Board of Directors, is one which it is to be hoped may be found capable of realization. It cannot, of course, be carried out without some disturbance of existing conditions; and the Directors and Mr. Padfield will, no doubt, carefully consider all that may result from such changes as an alteration in his position would cause. Difficulties of this kind should, however, not be insurmountable; and Mr. Padfield's appointment as a Director would be a compliment and an honour which his services to the Company have well earned.

PERSONAL.

Mr. CHARLES HUNT, M.Inst.C.E., has consented to act as Consulting Engineer in this country to the Dessau Vertical Gas-Retort Company.

At the meeting of the Metropolitan Water Board last Friday Mr. ARTHUR NEWTON, the Deputy-Comptroller, was appointed, on the recommendation of the Finance Committee, Accountant to the Board, in succession to the late Mr. F. Harris.

In the list of the candidates selected by the Council of the Royal Society to be recommended for election as Fellows, we notice the name of Mr. DUGALD CLERK, M.Inst.C.E., the predecessor of Sir George Livesey as President of the Society of British Gas Industries, and a Past-President of the Junior Institution of Engineers.

We learn that Mr. WILLIAM ANDERSON, who since 1883 has filled the position of Assistant to Herr Leonhard Körting at the Hanover station of the Imperial Continental Gas Association, has been selected by the Board to succeed him as the Engineer and Manager of the station. We heartily congratulate him on his promotion, and offer him our best wishes for his success in the more responsible position he has been called upon to fill.

After the ordinary business at the half-yearly meeting of the South Staffordshire Water Company last Thursday, Mr. FRANK JAMES, the Chairman, announced his intention of retiring from the position, after a connection with the Company since its formation and a chairmanship dating from 1874. He joined the Company in 1858, in 1860 was appointed Auditor, and the following year a Director. Since 1858 he had never missed a half-yearly meeting of the Company, and since 1861 had only missed one monthly meeting of the Board, and that was when he was engaged in London before a Parliamentary Committee in the Company's interests. He said he could not quit the chair without acknowledging not only the confidence his colleagues had reposed in him, but the assistance he had received from them. They had been an amicable Board, and he had more feelings of regret than he could express at relinquishing his position among them. There were several warm tributes from the shareholders present; and a resolution was passed to the effect that the sum of £200 should be added to the fees of the Directors, which they might allocate as they thought fit.

Scottish Junior Gas Association.—As mentioned in our "Notes from Scotland," meetings of the Eastern and Western Districts of the Association took place last Saturday; but, owing to the crowded state of our columns, we are compelled to hold over till next week our reports of the proceedings.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 530.)

THINGS on the Stock Exchange last week were not a bit better than they were the week before; and several markets suffered from adverse factors which were inimical to them specially. The consequence was that some of them were crushed into inactivity; and the whole volume of business in general was much restricted all round. The Government Licensing Bill effectually killed the Brewery Market; and the Great Northern and Great Central Inquiry paralyzed railways. Consols and some of the gilt-edged division were about the only chief lines to keep their ends up. The tone was dull on the opening day, and rather sensitive to agitating rumours; but closing prices did not show much change, On Tuesday, the settlement began, promising to be a light operation; and prices held fairly firm. Wednesday brought about a rather duller tendency with a shrinkage in values. There was a little disposition to greater steadiness on Thursday, coupled with a shade more activity. This, however, gave way again on Friday before the Licensing Bill, which extinguished every reviving spark. On Saturday, everything was flat or dead quiet, except Consols, which had a smart rise. In the Money Market, there was a good steady demand in view of the settlement and the month's end requirements at firm rates; but discount quotations pursued an easier line. Business in the Gas Market showed no disposition to increase in volume, and—except in respect of *ex div.* variations, which were very numerous—there were not many changes of quotation. These marched irregularly; but, on the whole, the advances outnumbered the retrogressions. In Gaslight and Coke issues, the ordinary was rather quieter, and prices were a little easier, ranging from 97⅜ to 96½. The secured issues were very quiet; the maximum marking 87 and 87½; the preference 106¾ and 108; and the debenture 83 and 84. South Metropolitan was steady and unchanged; all transactions being within the limits of 121¼ and 122½. The debenture was done at 83½. In Commercials, nothing was dealt in but the debenture, which fetched 83. In the Suburban and Provincial group, Alliance and Dublin debenture was done at 98¼ and 98¾, Brentford old at 243¾ *ex div.*, British at 43⅜ and 43½, Bromley "B" at 88, West Ham at 105¼ and 105½ *cum div.*, and 101 and 102 *ex div.* In the Continental Companies business was quiet. Imperial changed hands at from 180 to 181½, ditto debenture at 92½ and 93, Union at 118, Cagliari at 26½, Tuscan at 10½, and ditto debenture at 99 and 99½. Among the undertakings of the remoter world, Buenos Ayres was done at 11¾ and 11⅞, Melbourne 5 per cent. at 102½, ditto 4½ per cent. at 102½ and 102¾, Oriental at 142, Primitiva at 7, River Plate at 13 13/16 and 13⅞, and ditto debenture at 93.

ELECTRICITY SUPPLY MEMORANDA.

Slanderous Statements—House Agents and the Prevention of Corruption Act—Signs of the Times—"Critical State" of a Municipal Undertaking through Metallic Filaments—Gas Company's Advertisement—Osram Lamp Renewals for Public Lighting.

THE practice of the managements of many electric light undertakings in striving to cultivate business by making slanderous and untrue statements about the commodity of competitors, is one upon which we have often had occasion to comment. Of statements that are absolutely true we have no fear, and those that lean towards the side of the legendary can be tackled with ease and amusement. But certain malicious and untrue assertions as to the extremely poisonous character of the products of the combustion of the small quantity of gas used in incandescent burners, and as to the fearful extraction of oxygen from the atmosphere to support combustion, may have the effect of doing a considerable amount of injury to business among people who have no means of testing the truth, and who are ready to believe anything they hear or read bearing upon the question of health. When such slanderous statements emanate from a municipal electricity undertaking, and are obviously intended to injure the business of a large private ratepaying concern, there is greater cause for resentment; and we fully believe that a company suffering loss of business from the circulation of such statements would have good ground for legal action. It may be remembered that the Gaslight and Coke Company commenced to move some time ago in the matter of circularized mendacious statements from a competing municipal electricity concern; the result of the step they took being that the St. Pancras Borough Council were not long—and without driving the Company to legal proceedings—in seeing fit to withdraw a damaging statement from a pamphlet as to the consumption of oxygen by a gas-burner. The incident will be found referred to on p. 8 of No. 1 of our "Illuminating Truths."

But there is a new form of business-getting procedure introduced by electricity suppliers that appears to be under certain circumstances, illegal, or, under all circumstances, to be running dangerously near the line of illegality. The matter was treated upon in the useful and instructive article contributed to our pages last week by Mr. V. R. Balfour-Browne. House agents, most householders know by bitter experience, have developed a system (paltry and undignified) by which they add to their income by collecting commissions from tradesmen—from butchers, bakers, milkmen, and others—for introducing the names and addresses of persons to whom they have sold or let a house; and for weeks possibly before removal the person with whom the agent has done business is tormented by the importunities of the tradesmen in the neighbourhood in which he is going to take up his abode. In a case that has come under the notice of our legal contributor, an electric light company has entered into an arrangement (to the detriment of the local gas company) whereby commission passes from them to house agents for any lighting business the agents can secure for them from new tenants. In the opinion of Mr. Balfour-Browne, if the house agent is the agent of the incoming tenant, the acceptance of a gift or consideration from the electric light company would come within the Prevention of Corruption Act, 1906; but whether he is agent of the tenant or the landlord, it is also his opinion that the acceptance of the gift or consideration brings the agent perilously near the line. If so, it must also do the same in the case of the electric light suppliers who offer the gift or consideration. The point is interesting; and some day perhaps the matter will, if the practice is continued, find its way into the Law Courts.

Shareholders of electric lighting companies are naturally a little fidgety over the probable effect of the metallic filament lamps upon the businesses in which they have invested money; but to their inquiries, directors and officials can give them nothing more than the evasive reply, "They may do us good; they may do us harm." But the experience up to now is that these higher efficiency lamps are tending to very appreciably depress the revenue from lighting. That is so in the case of the St. James' and Pall Mall Company. Metallic filament lamps have already been installed in the Company's district on a fairly large scale; and, according to the Chairman (Mr. Walter Leaf), they have undoubtedly led to a sensible loss of revenue—that is to say, the increase in the revenue would have been considerably more last year had these new lamps not been installed. Not only so, but Mr. Leaf thinks in the current year shareholders must look to a continuance of this element of loss in revenue. This is the first and obvious effect of lamps that will give twice and even three times the amount of light from about the same current as was consumed by an old 16-candle carbon filament lamp. But Mr. Leaf, like many others who have to satisfy sensitive and wondering shareholders, congratulates them on the fact that the change is coming about gradually; the new lamps not having yet been brought to a point at which they can supplant the carbon filaments at once and in all places—"far from it." Moreover, it is thought the new lamps will create a demand for light, will consequently increase the quantity of current used, will enlarge the area of supply, will augment the light-giving capacity of the generating plant, and so defer capital expenditure, and will ward-off the need for any immediate reduction of price. But what is this we read? "Owing to the stationary character of the municipal electricity output at Falkirk—attributed to the introduction of the economical metallic filament lamps—it has been decided to increase the charge for energy to 5d. per unit." And, again, what of Hastings?

Poor Hastings Electricity Department! It is never long free from troubles. No sooner do the officials look hopefully for a little peace than something fresh comes along to worry them. This time it is the metallic filament lamp that is the reputed main cause of mischief; and a contributory cause is the working of the department, in the matter of prices, at a too narrow margin, and in some cases no margin at all. The metallic filament lamp is, we venture to think, going to be the means of putting into the balance the policy in the matter of charges of many municipal electricity undertakings; and many there will be who will be found sadly wanting. The Hastings electricity undertaking has never had anything worth boasting of in the matter of "profit;" what it has had to show has usually been a deficit. The estimates for the general district rate have been before the Council; and the estimates of the Electricity Department for the year ending March show the big deficit of £3250 on the year's working—involving (if it had been allowed) an increase in the rates of at least 2d. in the pound. The ratepayers are angry over it; and there is some talk of a serious resistance to the mode of meeting the deficient revenue of the undertaking by letting it fall on the hapless ratepayers. It is altogether unreasonable that those who do not consume electricity should be time and again taxed in this way. The main items in the deficiency are an increase in interest and sinking-fund charges of £944, a deficiency in the income from public lighting £921, and private lighting £1214—the last-named sum, the Committee acknowledge, being almost exclusively due to the metallic filament lamps. The "Hastings Observer" publishes a testimonial from certain electricity consumers as to the great saving they have effected by adopting the Osram lamp in place of carbon filaments. This being so, and the users enjoying such immense savings, the course for the Corporation appears to be perfectly plain—that is to increase the price of current, instead of taxing people who have had no part in producing the deficit. Our contemporary scouts the idea of raising the price, but suggests further speculation as a possible means of attaining a more flourishing state. The plan submitted is that the private residential field should be vigorously attacked—the Corporation offering to instal electric light and to recoup themselves by the aid of rent. The elementary proposition looks simple, and without obstacle to success. Our contemporary, however, manifestly knows little about the expense of installing electricity, knows little or nothing about the expense of the renewals of the Osram lamp, knows nothing about the financial

difficulties that other electricity undertakings have found in the wiring business, knows nothing of the number of installations left derelict and unpaid-for, and upon the hands of the departments after a time, and of installations that have had to be removed because of a new tenant's preference for another system of lighting. There is no doubt that the electricity undertaking at Hastings is in "a very critical state." When a person or thing is in a "very critical state," great care must be exercised; and the best friends of the Corporation will be those who, in considering this wiring question, adjure the controlling body to look well before they take a leap which may land them in still greater difficulties, for whether meter-rent is charged or not, consumers cannot be compelled, even by agreement, to use only one form of illuminant (particularly if result does not conform with representation), nor can they be compelled to continue their tenancy of one particular house because they are electricity consumers. However, the metallic filament lamp has caused a great deal of leeway at Hastings; and the idea is to make up the leeway if possible, by fostering this lamp to the utmost. We fear for the result, without an increase in price. But the Chairman of the Electricity Committee thinks the position might be met by having the whole of the streets in which cables are laid lighted by electricity, instead of paying £5000 to an outside Company while they have a commodity of their own. He asks why this obvious course out of a difficulty should not be taken. The ratepayers' answer would be the simple one, "Because it costs £3996 to light by electricity 4 miles of streets in the town, and by gas only £5883 for 66 miles of streets. The Electricity Committee have a bitter pill to swallow. At the last meeting of the Council, an amendment proposed to the district rate was carried, reducing the estimates of the deficit of the Electricity Department by £1625 —thus permitting the rate to be 1d. less than suggested.

Meanwhile the Hastings and St. Leonards Gas Company are meeting the glorification by electricians of the metallic filament lamp, which is credited with having played such sad havoc with the finances of the Electricity Department, by some prominent advertisements in the local papers. Following the name of the Company, address, and telephone number (which is useful when the patience of electric light consumers has been exhausted) are set out in bold letters the words "The Cheapest Light—Incandescent Gas." Then the advertisement goes on to say that, in a recent electric lamp advertisement, certain figures were given, from which the following figures (samples only of several in the advertisement) are deduced. These figures show what the electricity consumers mentioned would have saved, had they used modern gas lighting at the present price, instead of metallic filament lamps.

For Quarter ended December 25, 1907.

Consumer.	Stated Cost of Electricity. £ s. d.	Cost of Equivalent Gas Lighting at Present Price. £ s. d.	Saving by Using Gas. £ s. d.
A.	7 17 6 ..	2 9 3 ..	5 8 3
B.	13 18 11 ..	3 7 1 ..	10 11 10
C.	2 10 7 ..	1 1 1 ..	1 9 6
D.	6 9 4 ..	2 13 11 ..	3 15 5
E.	5 17 1 ..	1 16 7 ..	4 0 6

The example is worth publishing for its suggestiveness to other gas managers.

The cost of renewals looks like having a bad effect on the chances of the Osram lamp for public lighting use. The Barnes District Council have been considering the relative claims for street lighting of the Nernst, the Tantalum, and the Osram lamps; and the Electrical Engineer has reported on the matter. The statistics he gives are of interest. He takes the charges for electricity at 1½d. per unit, and the annual running hours for public lighting at 4000. The life of the Tantalum and Osram lamps are based on the guarantees given by the sellers; that of the Nernst being the result of the Council's own experience. The prices given are the net results on quotations for large quantities. The figures will be of value to gas engineers for use when called upon to deal with these rival lamps to ordinary incandescent burners in street lighting. Candle-powers: (1) Nernst 50, (2) Tantalum 40, (3) Osram 60. Total candle-power per post per annum: (1) 200,000, (2) 160,000, (3) 240,000. Watts per candle-power per hour: (1) 2·1, (2) 1·95, (3) 1·3. Units per post per annum: (1) 420, (2) 312, (3) 312. Life of lamp in hours: (1) 450, (2) 750, (3) 750. Lamp renewals per post per annum: (1) 8·88, (2) 5·33, (3) 5·33. Cost of single renewal per post: (1) 1s. 6d., (2) 3s. 9d., (3) 6s. Cost of renewals per post per annum: (1) 13s. 4d., (2) £1, (3) £1 12s. Cost of current per post per annum: (1) £2 12s. 6d., (2) £1 19s., (3) £1 19s. These figures show that, taking annual renewals and electricity at only 1½d. per unit (*without reckoning any other labour or attention required, and incidental expenses*), on a lighting table of 4000 hours, Nernst lamps of the credited candle power would each cost per annum £3 5s. 10d., Tantalum lamps £2 19s., and Osram lamps £3 11s. Fifty Nernst lamps, as a result of this inquiry are to be replaced by Tantalum lamps, as the Nernst bodies succumb to use and age; and then it may be expected that from Barnes another report will be made. There is, of course, the difference in the reputed lighting powers of the Tantalum and the Osram lamps; but if a single Osram lamp-post can run up a bill for renewals of £1 12s. in a twelvemonth, a big account over a number of lamps would soon be reached.

INSURANCE UNDER THE WORKMEN'S COMPENSATION ACT.

With the preliminary announcement as to the arrangements for the annual meeting of the Institution of Gas Engineers in June (noticed elsewhere), Mr. Walter T. Dunn has distributed the report of the Committee on Insurance under the Workmen's Compensation Act, 1906, which report was adopted by the Council at their meeting on the 10th ult. The Committee was appointed upon a resolution introduced by Mr. C. Stafford Ellery, and unanimously passed, at the meeting of the Institution at Dublin last year. The Committee consisted of the President (Mr. W. Doig Gibb), Vice-Presidents (Mr. Thomas Glover and Mr. James W. Helps), Mr. Charles Carpenter, Mr. Charles Hunt, Mr. Daniel Irving, Mr. R. G. Shadbolt, Mr. Ellery, and the Honorary Secretary (Mr. S. Y. Shoubridge).

The Committee (who it is seen went about their inquiry in a most thorough manner), on approaching the subject, felt it would be advisable to first obtain as much information as possible as to the existing position of gas undertakings in regard to insurance, and as to what had been their experience of the operation of the Act of 1897. Accordingly a schedule of questions was prepared and issued to the members of the Institution. Replies to the number of 252 were returned, and from them it was found that the sum paid in premiums by the gas undertakings represented was more than double that received from insurance companies in meeting claims, and that the average rate paid was about 7s. 6d. per cent. It was also shown that the rate for insurance under the new Act varied considerably; the maximum reaching as much as £1 per cent.

A letter was, therefore, addressed on Oct. 3 to the Accident Offices Association calling attention to these facts, and suggesting that the Association should consider the desirability of proposing a reduction of the excessive terms which were being quoted, and that a joint conference on the matter might advantageously be held. Several letters passed, and the Institution Committee, we must say, received somewhat discourteous treatment from the Association, who exhibited an inexplicable indifference to the matter. It was not until Nov. 15 that the following letter was received by Mr. Dunn from the Secretary to the Accident Offices Association (Mr. W. R. Gaff):—

Dear Sir,—I duly received your letter of the 12th inst. *re* above, and as there was a meeting of the General Purposes Committee of the Accident Offices Association to-day, availed myself of the opportunity of bringing it before them. I am directed to inform you that the rates at present charged by the principal companies for the insurance of the employees of gas undertakings were based upon the experience of a huge volume of business covered by them during the past nine years under the Workmen's Compensation Act, 1897, *plus* a reasonable loading for the additional liability in connection with the Act which came into force on the 1st July last.

It is, of course, impossible to know what the cost will be until experience has been gained of the actual working of the new Act; but should it transpire that modification could be made with safety in the existing rates, my Committee desire me to state that they would be pleased to make a reduction.

With regard to the figures furnished in your letter of Oct. 3, my Committee wish to point out that it would be fallacious to arrive at a conclusion as to the cost upon such details, as it is obvious that the gas companies throughout the country can only have particulars of the sums which they have themselves disbursed in connection with claims, and cannot possibly have reliable knowledge of the serious claims settled by insurance companies, and of the cases that still remained to be disposed of.

The Committee after considering the above letter came to the conclusion that no good would result from pursuing the correspondence with the Association, and decided to communicate with each of the insurance companies mentioned in the replies to the schedule of questions. They were requested to send particulars of their terms for insurance, and other necessary information, so that statistics relating to all offices, whether attached to the Accident Offices Association or not, might be obtained. It was found from the replies that, generally, lower rates were quoted by certain companies not connected with the Accident Offices Association; the companies connected with the Association all quoting a uniformly higher rate.

A modified system of insurance (A) and also a profit-sharing scheme (B) were suggested by one of the Companies approached, who submitted the following Memoranda upon them:—

A.—Suggestion for Modified Scheme of Insurance.

In numerous cases it has come to our knowledge that the insurance of workmen under the scheme of the Workmen's Compensation Act, 1906, providing for compensation in accordance with the Schedule to that Act, does not meet the requirements of large employers of labour and public bodies. The necessity of insurance is caused by the possibility of serious loss which might devolve on employers in cases of permanent or fatal injury to workmen. The petty accidents which incapacitate workmen for short periods—say, not exceeding six weeks—could well be dealt with by large employers without insurance; and by reason of the relationship existing between employers and employees, and the facilities the former have for dealing on the spot with small claims, and of checking abuses, would enable such employers to settle such cases in a far more economical manner than the insurance companies can.

If large employers of labour would carry the risk, and pay compen-

sation in respect of all accidents of (say) six weeks from the date of such accident, and only insure against fatal accidents, and permanent incapacity, the premium rates would be reduced by about 30 or 40 per cent. Some of the advantages of employers dealing with such minor accidents would be: (1) They could compensate more liberally than the Act provides in deserving cases. (2) They could check malingering, and in some way punish offenders by refusing to re-employ where it was shown that a workman was making a profit through such malingering. In many cases, the receipt of half wages which the Act provides, coupled with payments from a sick club or benefit society, amounts to more than the workmen's average wages.

B.—Profit-Sharing Scheme for Gas Companies.

Provided that a sufficient number of gas companies will co-operate, this Society will quote special rates for compensation insurance, keep the accounts of such class separate from its ordinary business, and at the end of three years, and thereafter annually, it will return one-half of the profits to the insured after paying claims, and deducting 25 per cent. for working expenses.

On the assumption that the claims were 33 per cent., which is about the average loss the Society has experienced, the scheme would result as follows:—

For annual premium of	£100
Claims	£33
Expenses	25
Society's profit	21
Returned to insured	21
	£100

The Institution of Gas Engineers could appoint auditors to examine the accounts and to approve the form of policy to be issued.

Having regard to the system of special insurance without the intervention of an insurance company, which is in successful operation in various places, the Committee felt the desirability of ascertaining whether it would be possible to suggest any practical schemes whereby mutual insurance could be generally instituted throughout the gas industry. As legal considerations were necessarily involved, they obtained the opinion of Mr. C. A. Cripps, K.C. The questions and replies were as follows:—

Q. (1) Whether an arrangement such as has been suggested for mutual insurance is within the powers of the gas companies.

A. (1) An arrangement such as has been suggested for mutual insurance is not within the powers of the gas companies. The sections referred to in the instructions would not empower a company to carry on a system of insurance even though the insurance was on the mutual principle, and limited to the insurance against accidents to the gas companies' employees. It cannot be said that such a scheme of insurance is incidental to the business of a statutory gas company; and the same consideration would apply to a limited company, unless the power is expressly given.

Q. (2) If so, whether the expenses of the scheme could be charged to revenue in the ordinary way, or could be charged to any of the special funds—viz., the reserved fund, the insurance fund, or the reserve fund.

A. (2) This point does not arise; but it follows from my answer to the first question that the expenses of such a scheme could not be charged to revenue in the ordinary way, or to any of the special funds.

Q. (3) Whether any such scheme could be carried out by the Institution of Gas Engineers, or what is the best method to adopt.

A. (3) In my opinion, no such scheme could be carried out by the Institution of Gas Engineers as at present constituted. The only possible method would be either for persons interested in the gas industry to start an insurance company to enable the gas companies to insure against accidents to their employees, or for the gas companies to get the necessary statutory authority to combine on the mutual insurance principle.

Q. (4) Whether any club or association formed to carry this out would require to be registered under the Companies Acts.

A. (4) Yes.

It will be seen from the above that Counsel advises that the only possible method by which a practical scheme of insurance could be instituted throughout the gas industry would be either:—

1. For persons interested in the gas industry to form an insurance company to enable the gas companies to insure their employees; or

2. For the gas companies to get the necessary statutory authority to combine on the mutual insurance system.

1.—*As to the Formation of an Insurance Company by Persons Interested in the Gas Industry.*

An essential to the success of such a Company must, obviously, be the permanent support of the gas companies, or a substantial majority of them. The gas companies would therefore first have to be circularized as to whether they would be willing to insure their employees in the proposed Company, and also as to whether they would be willing to guarantee any of the capital, and to what extent. Such gas companies as would be willing to insure their employees in the Company would doubtless take shares in it, either by their directors or otherwise. The Company would be formed and registered under the Companies Acts in the usual way. A deposit of £20,000 would have to be made with the Paymaster-General as a condition precedent to registration. This sum would be invested, and the dividends therefrom paid over from time to time to the Company. This deposit would appear to be the chief obstacle in the way of the formation of the Company, since it is suggested that a Company once established could successfully and substantially carry on its business with a paid-up capital of much less than £20,000.

Points in favour of the formation of such a Company would be: (1) Lower rates; (2) the possible establishment of a standard permanent rate for all gas companies; and (3) being directed by persons intimately connected with the gas industry, there would be a tendency to discharge doubtful claims rather than contest the strict legal liability in the Courts. This would be desirable and beneficial both to the Company and to the assured, and tend to maintain friendly relations between employer and employed.

2.—*As to Gas Companies obtaining the Necessary Statutory Authority to Combine on the Mutual Insurance System.*

This would necessitate the alteration of the Memorandum of Association of each gas company, which could only be effected, as regards statutory companies, by Act of Parliament, and as regards non-statutory companies by a special resolution passed by the shareholders and subsequently confirmed by the Court. Of course, those gas companies which are being carried on *privately* without parliamentary powers have no such obstacles in their way. It is suggested that, if a mutual insurance system was desired by the gas companies, perhaps the most satisfactory way would be for them to combine and apply for a Mutual Act giving them the necessary powers, as certain gas companies recently did in connection with the sulphur restrictions. The cost to each company in such case might be very small. No deposit with the Paymaster-General would be required as in the case of No. 1.

Outline Scheme proposed for a Mutual Insurance Association.

The Association would be registered under the Companies Acts, limited by guarantee, with a membership not to exceed a specified number. It would not have a capital divided into shares. Not being established for the purpose of profit, its articles would be different from those of an ordinary trading company. For instance, the provision relating to shares and dividends would be omitted. In fact, the articles would resemble the rules of a club more than anything else. They would contain provisions as to how persons were to become members, and their privileges as members, and in what events they would cease to be members. The management would be vested in a committee or council; and the articles would provide for the election of its members. To become a member of the Association, each company would make a return in a particular form to be agreed upon, giving the number of their employees and the respective wages paid to them, and pay a nominal fee. The liability of each company in case of accidents would be to the extent of a fixed percentage on the amount of wages shown to be paid by them to their employees. In the event of a claim for compensation and its validity being proved, and the members' liability under the Act being duly ascertained, a statement would be prepared by the Secretary of the Company apportioning the total sum payable thereunder among the members of the Company, and notice would be given to every member of the amount payable by him, and also of the reasonable expenses (including an agreed amount for the secretary) in connection with the claim which would be rateably apportioned among them. The Association could undertake insurance beyond the liability imposed by the 1906 Act; thus covering all accidents to employees.

The Institution Committee are of opinion that all, except the smaller undertakings, would do well to insure against accidents by setting aside a sum out of profits every year equal to that asked by the insurance companies. This would create a fund sufficient to meet the liabilities, and the yearly contribution to it could be varied as found necessary; or, as an alternative, and more particularly in the case of small undertakings, the Committee are of opinion that it would be well to adopt the principle of a modified scheme of insurance whereby the insurance would be against fatal accidents and accidents causing permanent incapacity. The Committee also desire to point out that certain undertakings have contracted out of the Act, and that those undertakings believe the arrangement to be mutually satisfactory to themselves and their workmen.

Professor Lewes on "Fuel and its Future."

As mentioned when noticing the provisional arrangements of the Royal Society of Arts for the present Session, Professor Vivian B. Lewes, F.I.C., F.C.S., will give a course of four Cantor Lectures this month on the subject of "Fuel and its Future." The first will be delivered next Monday evening, when the Professor will deal with the formation of fuel, the storage of energy during the growth of vegetation, and the production of cellulose and its conversion into wood, peat, and coal. He will also furnish particulars in regard to natural liquid and gaseous fuels. The remaining lectures will be given on succeeding Mondays at eight o'clock.

Adoption of Co-Partnership by the Rugby Gas Company.—At the annual meeting of the Rugby Gas Company last Friday, it was unanimously decided to adopt the co-partnership system.

THE EXPLOSIVE COMBUSTION OF HYDROCARBONS.

A good audience, comprising many distinguished scientists and a sprinkling of well-known gas men, gathered in the lecture theatre of the Royal Institution on Friday evening last, to listen to Professor W. A. Bone, D.Sc., Ph.D., F.R.S., on the subject of "Explosive Combustion, with Special Reference to that of Hydrocarbons."

The lecture, which was punctuated by a number of apposite and successful experiments, consisted essentially of a summary of the work on the combustion of hydrocarbons which Professor Bone has described, in conjunction with various *collaborateurs*, in a series of communications to the Chemical Society from 1902 onwards. We may, perhaps, here interject an expression of hope that ultimately Professor Bone may see his way to re-publishing these scattered communications in a monograph, in which form they will be more widely and generally accessible. Meantime, however, the lecture which he delivered at the Royal Institution afforded a useful summary, with the addition of some new matter, of one section of the work—viz., that dealing more particularly with the explosive combustion of hydrocarbons.

The lecturer commenced by saying that his subject was intimately associated with the name of Sir Humphrey Davy, who directed attention to it in 1815. Davy's investigations not only had the practical application involved in the production of the miner's safety-lamp, but various theoretical issues were disclosed by them. He studied the combination of explosive mixtures, and determined their explosive limits, and drew attention to the high temperatures of flames, notably that of cyanogen, to which he ascribed 5000° Fahr. He pointed out that flame was extinguished by contact with cooling surfaces, and by that of iron in particular. He found that combustible gases combined with oxygen at low temperatures without the manifestation of the phenomena of flame. He also discovered the surface combination of combustible gases and oxygen which is induced by platinum. Thus he had observed the production of carbonic oxide when a platinum wire had been kept incandescent by the combination of ethylene and oxygen in the presence of inert gas. The luminosity of hydrocarbon flames he rightly attributed to the incandescent carbon. He avoided the error of assuming that there was a preferential combustion of the hydrogen of the hydrocarbon. He also studied the rate of propagation of combustion in mixtures of combustible gases and oxygen or air.

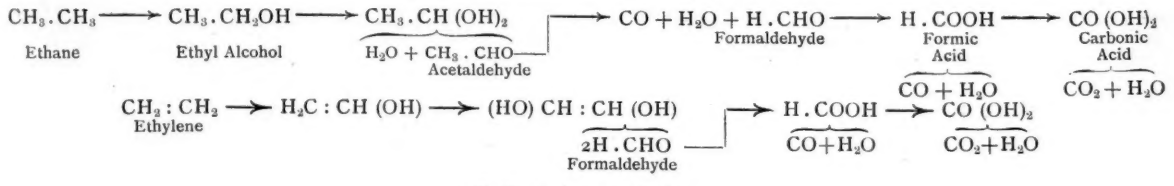
These introductory remarks on Davy's work brought the lecturer to the question of the propagation of flame, and so to his first experiment, in which he took a long glass tube containing nitric oxide, and broke in it a bulb containing carbon disulphide. After the vapour of the latter had mixed with the gas in the tube, the mixture was fired from one end. The flame travelled rapidly down the tube for about 12 inches, when it began to vibrate and alter in character—in this case becoming brilliant and attaining detonation, and then being propagated through the rest of the tube. But under other sets of conditions, the vibration and alteration of character would have resulted in the flame being extinguished. Detonation was first studied by Berthelot, Mallard, and Le Chatelier in 1881. A mixture of carbonic oxide and oxygen in their combining ratio afforded the best illustration of this phenomenon. The lecturer also drew attention to the setting up of the explosive wave, and to the extremely short duration of detonation—*e.g.*, in some cases only amounting to $\frac{1}{5000}$ second.

The complete combustion of hydrocarbons resulted in the production of water and carbonic acid; but the process involved a number of successive stages. As to what these stages were, various theories had been promulgated. The first theory, which generally prevailed in the last century, was that the hydrogen of the hydrocarbon was more readily combustible than the carbon, or that there was a preferential combustion of the hydrogen of the compound. It was not clear who was the author of this theory; but it was embraced by Thomas Graham and Michael Faraday. The second theory was promulgated by Kersten in 1861, but passed unheeded until 1892, when H. B. Dixon and H. Smithells adopted it, and used it to overthrow the first theory. The second theory is that in hydrocarbon flames carbon is burnt preferentially to hydrogen—that is to say, that carbonic oxide and hydrogen result from the combustion, perhaps directly or perhaps through an intermediate state. Thus before the hydrogen of the hydrocarbon burns, the carbon should, according to this theory, have been converted to carbonic oxide. The basis of this theory was that equal volumes of ethylene and oxygen, or of acetylene and oxygen, on explosion yielded carbonic oxide and hydrogen without the separation of carbon or water. But Professor Bone here pointed out that this theory of the preferential combustion of carbon was repugnant to established general principles, and could not be defended on *a priori* grounds.

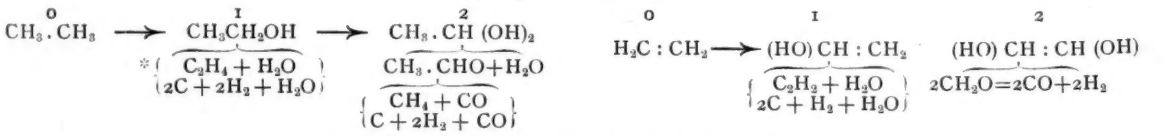
Professor H. E. Armstrong had suggested that the initial stage in the combustion of hydrocarbons was one of hydroxylation; but he supposed that the oxygen was conveyed to the hydrocarbon molecule through the intervention of steam. Professor Bone, however, pointed out that his own experiments had not shown that the presence of water was necessary for hydrocarbon combustion, but rather that the oxygen acted directly on the hydrocarbon. The point clearly demonstrated by his researches was that the initial stage in the combustion of hydrocarbons was the formation of an oxygenated molecule, and that other results were

Scheme of Combustion of Ethane and Ethylene.

(*a*) *Slow Combustion at* 300°—400° C.



(*b*) *Explosive Combustion.*



* Acetylene formed also the secondary decomposition of C_2H_4.

Table I.

Results of Experiments on Inflammation in Sealed Glass Bulbs.

Original Mixture.		$C_2H_2 + O_2$			$C_2H_4 + O_2$			$C_2H_6 + O_2$		
p_1		352 mm.			545 mm.			746 mm.		
p_2		508 ,,			1053 ,,			1148 ,,		
p_2/p_1		1·44			1·93			1·54		
Percentage Composition of Gaseous Products.	CO_2	0·75			0·30			4·20		
	CO	67·10			50·00			33·55		
	$C_2H_2 + C_2H_4$	*nil*			*nil*			2·75		
	CH_4	1·55			1·70			10·85		
	H_2	30·60			48·00			48·60		
		C	H	O	C	H	O	C	H	O
Units in original mixture		352	176	176	545	545	272	746	1119	376
Units in gaseous products		352	171	175	547	541	267	621	854	241
Difference		Practically *nil*.			Practically *nil*.			125	265	135

Table II.

Experiments on Inflammation in Sealed Glass Bulbs.

Original Mixture.		$C_2H_4 + H_2 + O_2$			$C_2H_2 + 2H_2 + O_2$		
p_1		503 mm.			534 mm.		
p_2		750 ,,			653 ,,		
p_2/p_1		1·49			1·22		
Percentage Composition of Gaseous Products.	CO_2	0·35			0·2		
	CO	39·60			39·8		
	$C_2H_2 + C_2H_4$	1·25			*nil*		
	CH_4	3·65			0·2		
	H_2	55·15			59·8		
		C	H	O	C	H	O
Original mixture		341	505	168	267	400	133
Gaseous products		346	478	151	262	394	131
Difference		..	27	17	Negligible.		

TABLE III.—*Inflammation of an Equimolecular Mixture of Ethane and Oxygen.*

—		A. In Long Tube.			B. In Large Globe.		
	p_1	701 mm.			685 mm.		
	p_2	1018 ,,			1187 ,,		
	p_2/p_1	1·45			1·73		
Percentage Composition of Gaseous Products.	CO_2	4·20			3·40		
	CO	34·80			36·10		
	C_2H_2	5·00	7·65		0·15		
	C_2H_4	2 65					
	CH_4	8·85			7·25		
	H_2	44·50			53 05		
		C	H	O	C	H	O
Original mixture . .		694	1041	354	678	1017	346
Gaseous products. .		643	738	220	558	805	255
Difference . . .		51	303	134	120	212	91
Difference per cent.		7·6	29	37·8	18	20	27·5

TABLE IV.—*Results of Explosion of an Equimolecular Mixture of Ethane and Oxygen under High Pressures.*

—		A. Detonation in Lead Coil.			B. Explosion in Steel Bomb.		
	p_1	1180 mm.			25·2 atms.		
	p_2	2240 ,,			51·7 ,,		
	p_2/p_1	1·90			2·05		
Percentage Composition of Gaseous Products.	CO_2	1·80			2·6		
	CO	39·10			37·2		
	C_2H_2	0·90	1·40		*nil*		
	C_2H_4	0·50					
	CH_4	7·70			7·0		
	H_2	50·00			52·2		
		C	H	O	C	H	O
Original mixture . .		1186	1779	587 mm.	25·35	38·0	12·55 atms.
Gaseous products. .		1151	1507	488 ,,	24·50	34·6	11·05 ,,
Difference . . .		35	272	99 ,,	0 85	3·4	1·5
Difference per cent.		3	15	17	3·4	9·0	12·0

secondary thereto. The initial stage was the same whether the combustion was "slow" or "explosive," or at low or high temperatures. The stages of the combustion of ethane and ethylene, (*a*) slowly at 300°—400° C., and (*b*) explosively, are displayed in the following schemes, which are derived from the results of Professor Bone's investigations at Manchester University.

The lecturer then proceeded to demonstrate the experimental grounds for his conclusions by a series of experiments on the combustion of mixtures of oxygen with (1) acetylene, (2) ethylene, and (3) ethane. He first employed three bulbs of stout borosilicate glass of 60 c.c. capacity, in which he fired by a centrally disposed spark equimolecular mixtures of oxygen with each of the three hydrocarbons named. The results of such a series of experiments, including the gas analyses (which could not be carried out during the lecture), are shown in Table I., in which p represents the initial pressure of the dry nitrogen-free mixture exploded, and p_2 the final pressure, corrected, of the dry nitrogen-free products. It will be seen that neither the acetylene nor the ethylene caused deposition of carbon nor the formation of steam, whereas in the case of ethane steam was formed, and (as appeared in the bulb fired before the audience) carbon deposited. The same results extended to the combustion of other gaseous olefines and paraffins with equimolecular proportions of oxygen. In order to determine whether the behaviour of the ethylene on combustion indicated some peculiarity of the olefines, Professor Bone had fired in a similar bulb a mixture of 60 per cent. of ethylene and 40 per cent. of oxygen—*i.e.*, less than the equimolecular proportion of oxygen—and had found that under these conditions water was formed and carbon deposited in considerable quantity. This experiment was repeated in the lecture room. The formation of so much water clearly pointed to hydroxylated molecules having been produced and decomposed in the hydrocarbon flames.

The next experiments shown were on the behaviour of mixtures in similar bulbs when the hydrocarbons in the mixtures were different, but the relative proportions of gaseous carbon, hydrogen, and oxygen were maintained the same in all by the addition to the ethylene and acetylene of the requisite proportion of free hydrogen. If the hydrocarbons were not burnt as such, but were first resolved into carbon and hydrogen, much the same result should be attained in the case of the three mixtures. The result for the ethane and oxygen has been given in the third column of Table I., and in Table II. are given the results for the mixtures of ethylene and acetylene with oxygen and the volume of free hydrogen requisite to give the same relative proportions of gaseous carbon, hydrogen, and oxygen in all three cases. It will be seen that from the ethylene and acetylene there was no deposition of carbon, and no, or only a negligible, production of water; proving that the result differed from that of the combustion of ethane. Incidentally, these experiments demonstrated a point to which the lecturer attached great significance—viz., the greater affinity of hydrocarbons, as compared with either hydrogen or carbon, for oxygen. Methane ought perhaps to be excepted from this generalization so far as high temperatures were concerned, though between 300° and 400° C., even methane was oxidized more readily than hydrogen.

The influence of the rate of cooling on the final system was, Professor Bone said, very great, and could be illustrated by the following experiments which he carried out in the lecture theatre. On taking two vessels of the same capacity (300 c.c. in this case), but one a globe and the other a long, narrow tube having a surface area three times as great as that of the globe, and exploding in each of them an equimolecular mixture of ethane and oxygen, the results differed greatly. In the tube the flame travelled slowly through its length at the rate of half-a-metre per second. The mixture was wholly inflamed, but without any approach to detonation. The products are shown in Column A of Table III. In the globe, the flame was brighter and spread instantaneously over it. More carbon was separated; but less water was formed than in the tube. The results are shown in Column B of Table III. Further, however, it was proved by applying Schiff's test that the products in the tube gave a strong aldehydic reaction, against a very faint one in the rinsings of the bulb. In the tube as much as 40 per cent. of the oxygen had gone to form steam. The more rapidly the flame was cooled, the more nearly were the initial products of the combustion obtained. Similar results were obtained in the tube by the combustion of a mixture of 60 per cent. of ethylene and 40 per cent. of oxygen. The formation of aldehydic derivatives could also be demonstrated by applying Schiff's test to the water condensed from a flame of air burning in coal gas. The test was applied to the product of such a flame which had been alight while the lecture was proceeding.

The question next dealt with by Professor Bone was as to whether the views enunciated were equally applicable to explosive combination under high initial pressures and to detonation. The investigations on the detonation of a mixture of ethane and oxygen could not conveniently or usefully be repeated in the lecture theatre, as they required special apparatus and manipulation. A coil of stout lead pipe, of 1 inch internal diameter and 20 feet in length, had been used, in conjunction with a special firing-piece containing electrolytic gas under high pressure. The coil had been immersed in a bath of boiling water, and charged with the ethane-oxygen mixture to a pressure of 1180 mm. The results of an experiment under these conditions are recorded in Column A of Table IV. The explosion had occurred practically instantaneously, and had not been propagated slowly as in the case of the long glass tube; so that it was clear that it was of the nature of detonation, as distinguished from ordinary inflammation. The experiments on the explosive mixture under high initial pressure had been undertaken in view of their bearing on combustion as it occurs in the cylinders of internal combustion engines. The explosion apparatus used comprised a cylindrical steel bomb, measuring externally 12 inches by 4 inches, and having a chamber 8 inches long and 1 inch in diameter. It had been previously tested by hydraulic pressure to 2000 atmospheres. It was filled with an equimolecular mixture of ethane and oxygen to a corrected pressure of 15·8 atmospheres, and the mixture was fired. The pressure of the products was, after correction for dead space, 30·6 atmospheres, or rather less than double the initial pressure. An initial combination of hydrogen would have given a final pressure 2½ times that of the initial pressure.

The foregoing figures are those obtained in the experiment carried out in the lecture theatre on Friday evening; but the results of a complete experiment made at a higher pressure are shown in Column B of Table IV. It should be observed that 7 per cent. of methane survives in the products, indicating the difficulty with which that hydrocarbon is oxidized at high temperatures. The products in the bomb were passed into ammoniacal solution of cuprous chloride; and it appeared therefrom that no acetylene had survived in them. It seemed likely that at higher pressures the methane would be decomposed to a greater extent, and the steam more acted upon by the carbon liberated; so that ultimately, if the pressure were high enough, the final products would be chiefly, if not wholly, carbon monoxide and hydrogen. Under such conditions there would be the appearance of a preferential combustion of carbon.

Midland Junior Gas Engineering Association.—We learn from the Hon. Secretary (Mr. James Hewett) that the third annual meeting of the Association will be held in the Birmingham Technical School on Saturday, the 14th inst. The business will include the reception of the report of the Council and the balance-sheet for the current session, the election of officers, and the consideration of the resolutions approved by the representatives of the Councils of the Junior Gas Associations at the conference held on the 8th ult. (see *ante*, p. 343), and the passing of resolutions upon them, so far as they apply to the Association. On the same occasion, Mr. Owen Evans, of Wrexham, will read a paper entitled "Sulphate of Ammonia Manufacture."

COIN-METER ROBBERIES.

By A. Canning Williams, F.C.I.S.

Robberies from prepayment meters are, as observed in your last issue, extending in a serious manner. I agree with you that the use of stronger money-boxes would be a step in the right direction. But there are also other measures, the adoption of which would tend to reduce the evil; and these I will proceed to explain.

Most gas undertakings doing prepayment business require applicants for coin-meters to sign an agreement in which clauses similar to the following are usually included:—

> I will be responsible to the Company for the safe custody of such money [deposited in the coin-box of the meter] until the same shall have been collected by the officers of the Company.
>
> That should I wish to cease consuming the gas of the said Company at the above premises [the address given at the head of the form], I will give the Company seven days' notice in writing of my intention so to do.

Now, the tenants of houses fitted up with slot installations are constantly changing; and the clause in the agreement in regard to the giving of notice is more often "honoured in the breach than in the observance." Consequently, it often happens that a new tenant goes into a house, finds the slot apparatus there and in working order, and forthwith puts it into operation without troubling to make application at the office. After a while, he in turn leaves the house in the same happy-go-lucky style (as regards matters gaseous) as he entered it.

The coin-meter thief keeps a watchful eye on any indication of a forthcoming "flit;" and when the course is clear, he obtains access to the premises (breaking one of the back windows near the fastener is a favourite method). Once inside, it is but the work of a moment or two to force open the padlock of the meter coin-box, or wrench off the staple, and abstract the hard cash.

The collectors, while on their rounds, come across empty houses where there are coin-meters; but as to gain entrance to them would in most cases mean going out of their way for the purpose of obtaining keys from house agents, &c., and would consequently cause a diminution in their receipts for the day, there is a temptation, to put it mildly, for these houses to be passed by.

Here are indicated two weak places in the system—viz., (1) the fact that a large number of slot consumers have not signed any agreement; and (2) the neglect, under ordinary conditions, to "clear" meters in empty houses.

How is it possible to compel a new tenant of a house where there is slot gas apparatus to make application at the office and sign an agreement? Clearly, by preventing him from obtaining a supply of gas until he has been through the formalities. And this can be done, after a vacating tenant's meter has been "cleared," by the collector inserting a cork in the inlet coupling of the meter. After doing this, he hangs on the meter a card bearing some such announcement as this:—

> ..... **GAS COMPANY.**
>
> NOTICE.
>
> ***Application for a Supply of Gas must be made at the Central Offices of the Company, ... Street.***
>
> HOURS:
> 9 to 5; Saturdays, 9 to 12.

When in due time the new tenant puts in his appearance at the office, the agreement form is carefully read over to him—special stress being laid on the clauses quoted—and he signs the paper; a duplicate being handed to him. This has a moral effect not without its value.

In regard to empty houses, it is clearly unreasonable to expect a slot collector to spend half-a-day in key-hunting. Arrangements should therefore be made for a man to attend to this special work. The collectors should each evening hand in a written report of the empty houses containing uncleared coin-meters that they have come across during the day; and, *at the earliest possible moment*, the keys of the premises should be obtained, and the cash removed from the meters. To facilitate this work being done, the officer doing this should be provided with a bicycle.

My communication is already, I fear, too long, so I will conclude by asking you to print some extracts from "Instructions to Prepayment Collectors," which bear upon the points raised. Form No. 84 referred to is inserted.

The scheme I have outlined is not a visionary one, but one that has been in successful working. Only the other day, three meters were reported broken open, and, on inspection of them being made, it was found that the amount abstracted was—*nil!* The meters had all been cleared by the cyclist inspector!

Reading, Feb. 28, 1908.

EXTRACTS FROM INSTRUCTIONS TO PREPAYMENT COLLECTORS.

In the event of the collector finding that the coin-box of a meter has been robbed of its contents, or a part thereof, he must furnish the Inspector *the same day* with full particulars on the form provided.

To every prepayment meter must be affixed two labels—one with respect to the giving of notice by the consumer before leaving the premises he occupies (Form No. 84); and the other warning consumers against the use of foreign coins, discs, &c. (Form No. 95). Each collector must carry a supply of these labels, and affix one or both to the meters where necessary.

Form 84.

IMPORTANT.

Anyone using this Meter is responsible for the safe keeping of it and its contents, and must

SEND 7 DAYS'

WRITTEN

NOTICE

To the Secretary, Gas Co., Central Offices, ———,

TO TERMINATE SUCH RESPONSIBILITY.

If the collector should find a house or other premises occupied by a tenant whose name is not in the collection-book, he shall obtain the tenant's signature to an agreement form; or, if the tenant be not at home, shall leave at the house an agreement form and a stamped addressed envelope, with a request that such form be signed and forwarded as soon as possible to the central offices. He shall also enter on the counterfoil of the agreement the name and address of the new tenant, and the date when the form was signed or left as the case may be, &c.

The collector must make reasonable efforts to gain access to empty houses; but, if unable to do so without causing considerable delay in his collecting work, he must make, on the form provided, a report of such empty houses *the same day*. These reports must be handed to the inspector.

On gaining access to a meter in an empty house, the collector, after reading the index and clearing the coin-box, shall turn off the main tap, unscrew the inlet coupling, insert a cork in the supply-pipe so as to effectually prevent gas from passing into the meter, and re-fasten the coupling. After doing this, the collector shall attach to the meter, in a conspicuous place, one of the printed notices provided referring to the central offices any future tenant who may require a supply of gas, and shall make a memorandum in his collection-book of the fact that the supply is stopped by inserting the letters "ckd" after the "consumption" column. On returning to the office, the collector must fill in a card for each supply so stopped, and hand the cards to the inspector.

Degree for Dr. Lunge.—The Senate of the Technical High School of Carlsruhe have decided, on the unanimous proposition of the Department of Chemistry, to bestow the degree of Doctor of Engineering upon Professor Dr. George Lunge, in recognition of his distinguished services in the advancement of technical chemistry.

Society of Engineers.—At the meeting of the Society at the Royal United Service Institution, Whitehall, last night, a paper was read by Mr. A. J. Metcalfe, on "The Treatment and Formation of Roads." In the course of it, reference was made to the recent tests and trials of materials and machinery for utilizing tar, and to the Judges' awards and remarks on the matter. The author also dealt with the subject of coating with materials previously treated with tar or other bituminous binders, and the cost. We may notice the paper more fully in a subsequent issue.

Masonic.—Northern Star Lodge, No. 3053.—The installation meeting of this Lodge was held at the Midland Hotel, Manchester, last Friday, and was attended by about a hundred members of the Lodge, the Province of East Lancashire, and visiting brethren from a distance. The retiring Master (W. Bro. William Prince, of Stoke-on-Trent) installed his successor (W. Bro. Robert Surtees, of Fenton) in a most impressive manner—efficiently assisted as he was by the out-going Director of Ceremonies (W. Bro. J. W. Broadhead, of Elland) and several of the Past-Masters. The W.M. subsequently appointed and invested the following officers: W. Bro. Wm. Batt (Manchester), S.W.; Bro. John Mackay (Bradford), J.W.; W. Bro. J. W. Scott (Stockport), Chaplain; W. Bro. Walter Whatmough (Heywood), Treasurer; W. Bro. R. G. Shadbolt (Grantham), Secretary; Bro. G. B. Smedley (Swadlincote), S.D.; Bro. Harold Barker (Buxton), J.D.; W. Bro. Jas. R. Lee (Manchester), D.C.; Bro. T. W. Jordan (Stockport), Organist; Bro. F. J. West (Manchester), I.G.; Bro. S. Meunier (Stockport), Bro. Jas. M'Ewan (Manchester), Bro. S. E. Halliwell (Littleborough), and Bro. E. O. Watson (Rawmarsh), Stewards. The Charity Representative of the Lodge is W. Bro. S. R. Ogden, of Blackburn.

MIDLAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Birmingham.

The Annual General Meeting of the Association was held last Thursday, at the Acorn Hotel, Birmingham. There was an average attendance of members. At the opening of the proceedings, the RETIRING PRESIDENT (Mr. Hubert Pooley, of Stafford) was in the chair.

The HON. SECRETARY (Mr. Charles Meiklejohn, of Rugby) read the minutes of the last meeting; and they were unanimously confirmed.

NEW MEMBERS.

The names of the following gentlemen were, by a unanimous vote, added to the roll: Mr. T. Thornton, of Rowley Regis; Mr. J. W. Hayes, of the Staveley Town Gas Company, near Chesterfield; Mr. S. G. Perrett, of Market Drayton.

ANNUAL REPORT OF THE COMMITTEE.

The annual report of the Committee and the statement of accounts were taken as read. The former sketched the proceedings of the past year, concluding by pointing out that the statement of accounts exhibited a balance in hand of £133 3s. 6d. Two members, it was also mentioned, had died during the year—Mr. W. Winstanley, of Newcastle, Staffs., and Mr. F. W. Parsons, of Rowley Regis—two had resigned, and three had ceased to be members. Seven new members had joined, leaving the number on the books at 108, as last year.

DISTRICT MEMBER OF THE INSTITUTION.

The PRESIDENT said it was his pleasure to propose that Mr. Harold E. Copp, the incoming President, be elected the District Member on the Council of the Institution of Gas Engineers for the ensuing year.

Mr. R. O. PATERSON (Cheltenham) seconded the motion.

Mr. COPP thanked the members heartily for the honour done him. He said he would do his best to adequately represent the Association.

The PRESIDENT said a year ago he took up the duties of the chair with great trepidation. Thanks to the kindness and consideration of the members, the Association had had what he thought was a most successful year. He hoped the members would extend to his successor, Mr. Copp, the same kindness and consideration that they had shown to him personally. He had much pleasure in introducing Mr. Copp to the chair.

Mr. HAROLD E. COPP, of West Bromwich, then took the chair amid the cheers of the members.

THANKS TO THE RETIRING PRESIDENT.

The PRESIDENT said there was one very pleasant duty to perform before he proceeded with his address. It was to propose a hearty vote of thanks to the retiring President. Mr. Pooley stepped into the breach which last year was caused in the presidency in rather an unfortunate manner; and at very short notice he discharged the duties in a most effective and efficient way. He thought they should place on record their high appreciation of the manner in which Mr. Pooley had filled the chair.

Mr. J. FERGUSON BELL (Derby) said he should like to second the vote of thanks to their late President. As the members knew, Mr. Pooley followed him at Stafford, so that perhaps he (Mr. Bell) knew more of his work than most of the other members. The Stafford Corporation were to be congratulated on having such a man as their Engineer. As President, he had discharged the duties in a very satisfactory manner; and his conduct in the chair had reflected credit on the Association.

The motion was heartily agreed to.

Mr. POOLEY, in responding, said he thanked the members very heartily for the kind way in which they had received this proposal. He would not say that, at this time last year, he faced the position with anything but fear. He had very short notice, and therefore very little time for preparation for the duties; and the preparation was rendered more difficult at the time by a family loss. Of course, the Association knew nothing about this. At the same time, he had that cause of anxiety upon him. He thanked the members most heartily for their kindness.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

My first duty must be that of expressing my sincere appreciation of the honour you have conferred upon me by electing me as your President, an honour which I esteem in a greater degree because my membership of the Association has been of comparatively short duration. On looking over the roll of Past-Presidents, which contains the names of many distinguished men who will leave their mark imprinted on the destinies of the important industry in whose interests we are all personally concerned, I must confess to a very real sense of misgiving; and, though my endeavours to uphold the prestige of the Association, and to emulate my predecessors in the chair must necessarily be inadequate, I trust that, with their assistance, and particularly that of our esteemed Hon. Secretary, my efforts may not prove wholly unacceptable to you.

The difficulty of selecting suitable subject-matter is one which is frequently referred to by those who are called upon to occupy the chair of an association such as this; for in these days it is assuredly no easy matter, in the preparation of a presidential address, to avoid ground which has been repeatedly traversed and to impart some degree of interest and originality. On these occasions, it is customary to present some sort of survey of the general aspects of the industry. One whose experience is more lengthened than my own might, with profit and interest, indulge in retrospection, or direct your attention to many benefits which have been derived from that experience, the result of which must necessarily be a broader outlook upon its various phases. I must therefore content myself with offering a few reflections upon some of those subjects which must be constantly present in the minds of those who are actively engaged in the management of gas-works, and with brief reference to some others which have suggested themselves to me in the natural course of events while considering the welfare of the undertaking which I have the honour of serving.

Of all public questions, perhaps that of education comes in for the greatest share of attention; but he would be a bold man who would say that the results hitherto attained—at any rate, as regards elementary education—have been commensurate with the efforts expended. At no time have there been greater facilities for both elementary and secondary education than at present; but, no matter how perfect the system in itself, it must fail to accomplish the best results unless accompanied with practical training, and with due attention to the development of character. To apply this to our own profession, we now have well-organized Junior Associations, displaying their vitality in a marked degree, as well as the excellent and well-written technical journals, of which we are justly proud, all doing very valuable educational work—in fact, the only complaint can be that the quantity of technical matter prepared for us must often exceed our powers of assimilation. I venture to think, however, that, with all these facilities, the young man who aspires to a responsible position in a gas-works will find himself very inadequately equipped unless he has engaged himself actively in the practical part of the business, including the ordinary routine, and the actual control and management of men. It is only by improved education and sound practical training that the status of the gas engineering profession may be raised to that higher plane which it should undoubtedly occupy, having regard to the diverse and intricate nature of the services that are required of its members.

Some of our electrical friends seem to derive much consolation from regarding us as representatives of a threatened industry which is fighting "with its back against a wall." The threats have been regularly forthcoming for the last forty years; and, as judged by recent events, its fighting powers show no signs of diminution. Moreover, the "wall" appears to be a very substantial structure, for the recently issued "Gas World Analyses of the Accounts of Gas Undertakings" shows that at no period was the industry more firmly established than it is to-day. In spite of the continual improvements in the use of gas, the output during the past year showed the satisfactory increase of 4 per cent., and an increase in the number of cookers of over 190,000.

One of the most unsatisfactory features of the past year has been the marked depreciation in the value of industrial securities, though in this respect we have suffered in less degree than many other industries. Company promoters have been active in matters more or less affecting us; and although their attentions are for the most part unwelcome, they may perhaps be regarded in the light of a delicate compliment. Here, again, we are indebted to our technical papers for the outspoken manner in which they have endeavoured to protect the interests of the gas investor. When one contemplates what I may call the hysteria exhibited by the British investor in matters relating to electricity, power gas, and fancy fuels, one wonders what is really becoming of our national reputation for business acumen and stolidity. But we may hope that his interests—at any rate, as far as gas companies are concerned—may in some measure be safeguarded by the operation of the new Companies Act.

It is satisfactory to note that the distribution of power gas in bulk is not likely to become a serious competitor in the near future, and that we need have no anxiety on account of that much-advertised product of incomplete carbonization named "Coalite;" while the competition arising from the use of suction gas for power purposes shows signs of becoming less acute. Mr. J. T. Snell, in his recent lecture before the Institution of Electrical Engineers, in giving the actual costs of electrical plants operated respectively by town gas and suction gas, rendered valuable assistance in clearing up this much-debated point. His figures are so important that I make no apology for reproducing them.

It is a matter for regret that the recent trend of legislation has been consistently unfavourable to the development of industry in general. As regards our own in particular, the new Workmen's Compensation Act has imposed a very serious addition to the burden of gas undertakings; and we may hope that the efforts of the Council of the Institution of Gas Engineers to obtain a uniform and reduced rate of premium for the workmen employed in gas-works may be effectual. Everyone will agree with the principle that the injured workmen should be adequately compen-

Load Factor.	Cost per B.Th.U.	
	Town Gas at 2s. Pence.	Suction Gas. Pence.
10	1·423	1·520
15	1·210	1·270
20	1·090	1·040
25	1·007	0·904
30	0·944	0·812
50	0·791	0·625
80	0·670	0·514

In the above table the price of town gas was taken at 2s. per 1000 cubic feet, and the average costs are, respectively: 1·019d. and 0·955d. But in towns where competition between the two sources of power is in progress, the price of gas for power purposes might be more fairly taken at 1s. 6d. The costs per B.T.U. would then become 0·762d. and 0·955d. respectively, which are far below the prevailing prices of electrical energy, and which must provide genuine cause for alarm on the part of those interested in the distribution of electricity from central stations.

sated; but legislation which benefits one section of the community, while inflicting injury upon another, is fundamentally unsound. And it cannot be denied that, under present conditions, the employer more often suffers injustice than the employee. Accidents in gas-works have increased considerably of late, and, in spite of all precautions, it is a matter of increasing difficulty to get the workmen to exercise reasonable care with a view to avoiding them—in fact, as the law now stands, it offers a strong temptation to the malingerer. In this connection, I may perhaps be pardoned for drawing attention to the advisability of using every endeavour to reduce the risk of serious accidents by the provision of suitable fire extinguishing and other apparatus. Many accidents might have been prevented by the exercise of a little forethought; and if insurance premiums are to be reduced, it behoves every gas engineer to give careful consideration to this matter.

The Bill which is to be promoted for restricting the hours of work in mines is also likely to prove a further tax upon industry; and, unless it is made in some measure two-edged, and the mine-owners are given some means of obtaining the output necessary to meet the demand without artificially forcing-up prices, its consequences are likely to be disastrous and far-reaching. It is earnestly to be hoped that our lawmakers will use their best endeavours to foster industry, as it is only by so doing that the capital of the country can be called forth into activity; for its prosperity, as also that of gas undertakings, can be to a great extent measured by the proportion of its capital actively invested. Perhaps the greatest menace is that which comes from the advanced type of what I may call predatory Socialism, which the men's leaders are endeavouring, with some success, to instil into the rank and file. Sir George Livesey recognized this danger many years ago, and, in consequence, formulated, and carried into very successful operation, his profit-sharing and co-partnership scheme, which must necessarily prove the very best means of establishing cordial relationship between Capital and Labour; for not until the British workman is convinced that his interests are to a large extent coincident with those of his employer will lasting industrial peace be attained.

It is undoubtedly a difficult matter to apply such a system in a municipal undertaking, as it would naturally be superfluous, if the idea of Municipalism were carried to its logical conclusion. I believe that the undertaking presided over by my immediate predecessor, Mr. Pooley, is the only one which has adopted it. But, in the case of companies, Sir George Livesey shows, in his recent paper before the Southern District Association, that in most cases beneficial results would accrue from its introduction, and it would in time prove a satisfactory solution of the question of old-age pensions. In passing, I should like to offer my congratulations to another Past-President, Mr. Berridge, on having put the scheme into operation at Leamington; while Mr. Belton has had the system in operation at Chester for some time. In this connection, Mr. A. E. Broadberry, of Tottenham, and Mr. Harold W. Woodall, of Bournemouth, are also to be congratulated on the pioneer work they are doing in the improvement and education of their workmen. But in work such as this, one has to move cautiously, and with due regard to the variation in character and conditions of workmen in different localities.

No doubt provincial gas undertakings owe a debt of gratitude to the London Gas Companies for the manner in which they have fought their battles for years past; and we are to-day reaping many benefits as the result. I refer principally to the removal of restrictive clauses in the regulations relating to the purification and testing of gas, as well as to the less antagonistic attitude of the Press and public towards gas viewed in the light of a competitor with electricity. But much yet remains to be done in this respect; for it is only by educating the public in the uses of gas that the prejudice which still exists in some quarters may be removed, and the consumer be enabled to realize the absurdity of many of the advertisements which some of our electrical friends are successful in obtaining at the expense of the non-technical or psuedo-technical Press. It cannot be doubted that, except in a few instances, provincial undertakings have not done their full share towards providing the wherewithal to carry on the fight for the continued supremacy of gas for lighting; and, although a difficult matter for managers of municipal undertakings, it is our duty to endeavour to convince the authorities of the necessity of contributing liberally to the Research Fund opened by the Institution of Gas Engineers.

PROVIDING FOR INCREASED OUTPUT OF GAS.

I will now refer to one or two matters which perhaps concern us more individually. The gas manager is often appraised according to the amount of profit he is able to show at the end of the year, or by what percentage his output has increased. Both of these criteria, however, seem to me to be unsatisfactory; for in these days of high rates of interest, the wise manager will endeavour to carry out his extensions as far as possible at the expense of his profit and loss account, and to reduce his capital account as opportunity arises. The wisdom of this course has been amply demonstrated at Widnes and at Sheffield, though it is necessarily a slow process. In West Bromwich, no capital has been raised since 1899; all extensions and improvements having been paid for out of revenue. The outstanding loan debt is now equal to 8s. 6d. per 1000 cubic feet of gas sold, as against 12s. 4d. six years ago. I venture to think that it would be an advantage if some account of such expenditure could be shown in the published accounts of gas undertakings. Then, with regard to increased output, this is in most cases almost beyond the control of the manager, depending upon the state of local trade; and, in many cases, an actual decrease (temporary though it may be) has been brought about by the improved uses of gas due to the energies of the manager.

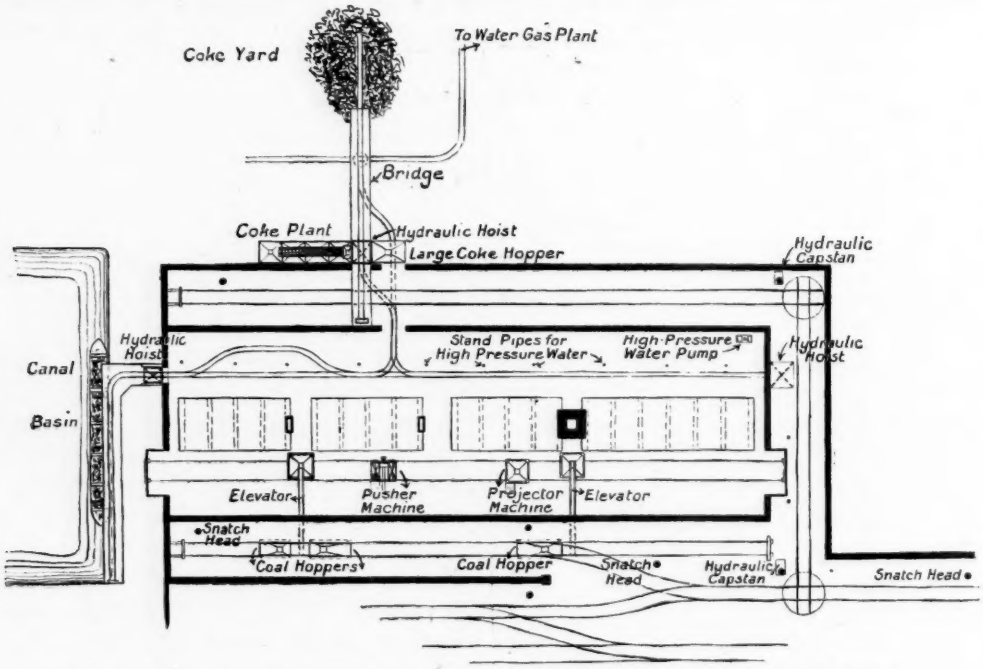
RESEARCH WORK.

With regard to our own Association, I often wish that more activity could be infused into its proceedings. Some three years ago, I had the honour of reading a paper before you bearing upon this subject; but the feeling of many of our members appeared to be that all active work should be undertaken by the parent Association. While, if adequate funds were forthcoming, I should agree in some measure with this opinion, I nevertheless believe that there still remains to us work which would prove of inestimable value. In a profession such as ours, individuality must be at work in almost every gas-works, whether great or small; and it is the outcome of this which, if placed at the disposal of the members of this Association, would be of so much practical use. For instance, one engineer perhaps makes a special study of purification, another of burners, or another of heating by gas; and while some might hesitate before undertaking to write an elaborate paper dealing fully with any subject, yet many would willingly contribute a short communication dealing with some specially interesting feature of it. The Committee appointed for the purpose would be prepared to receive such communications; and their reports would be likely to give rise to interesting discussions. In some manner such as this, I believe that its existence would be more fully justified. The American Gas Association has recently formed what is called an Information Bureau, which undertakes to supply information upon any suitable subject if satisfactory replies from any of the ordinary members are not forthcoming. This arrangement appears likely to prove a marked improvement on the "Question Box" system. The accomplishments of several of the Junior Associations should surely act as an incentive; and I sincerely trust that, as a result of our individual and united endeavours, the interests of the industry in general may be at least as well served by the proceedings of the Midland Association as by those of any other.

FEATURES OF MODERN CARBONIZATION.

What must be regarded as a most satisfactory sign is the attention which is being given by many able men in this country, as well as on the Continent, to the subject of carbonization. It is a difficult question, and one in which progress of a revolutionary character can only be attained as a result of patient investigation and costly experiment; and although the latter may be beyond the reach of most of us, yet I think that much useful information can be obtained by carefully observing the effects of different methods of working in the retort-house under existing conditions. Dr. Colman, in his recent lecture before the Manchester District Junior Association, has done a great service in presenting what knowledge is possessed upon the subject in a concise and suggestive manner. The Dessau vertical retort may now fairly be said to have emerged from its experimental stage, and there are several large installations at work on the Continent. The results recently given by Herr Körting of his vertical installations at Berlin seem to show that the present methods of carbonization are likely to be superseded in the near future. But what yet remains to be determined is the best length and area of the retort, and whether it is more advantageous to set it vertically or at a steep angle, so that the retort may be completely filled with coal in the manner advocated by Mr. Love, of Guildford. But I must confess that Mr. Harold Woodall's system of continuous carbonization appeals to me as being the most logical, as it seems to present greater facilities for keeping the process under direct control. The results of Messrs. Samuel and Thomas Glover's experiments will also be watched with the greatest interest.

In October of 1906, a complete set of "Jenkins De Brouwer" stoking machinery was installed at West Bromich. The retort-house contains 18 beds of eight 20-feet through retorts 22-inch by 16-inch, stopped in the middle. The bridge-pipes, not being sealed, are fitted with wing-valves, and the receiving main with retort house governors. On starting the machines (having removed the



Plan Showing the Method Employed for the Handling of Material at the West Bromwich Gas-Works.

"stops"), trouble was immediately experienced with choked ascension pipes, though the variation in pressure in the retorts did not exceed 1-20th of an inch. The charges were then 6 cwt., and the duration six hours. The difficulties were so great that the necessity of an alteration in the methods of carbonization soon became obvious. I attribute them chiefly to the fact that, as shown by the temperatures taken in the ascension pipes, uneven quantities of gas were passing up them, and that during the latter portion of the charge, the gases, becoming hotter, and containing no light oil vapours, extracted all the liquid hydrocarbons in the tar adhering to the inner surface of the pipes, and formed a hard deposit of pitch.

With the object of producing gas at all periods of the charge which should contain some proportion of light oil vapours, I increased the charges to 8½ cwt., and the duration to eight hours, at the same time attempting to thicken the charges in the middle of the retort and taper them down to the mouthpieces. An improvement was immediately noticeable, and very little trouble is now experienced. Moreover, the production per mouthpiece has not been seriously decreased. I then observed that whatever carbon was formed deposited on the roof of the retort near the middle, clearly showing that this was the point where polymerization of the gas was taking place; and, were it not for the difficulty of arranging the work with 10 cwt. or 12 cwt. charges of ten hours duration, and the risk of breakdown to the discharging machine (and consequent inability to discharge the retorts), I should have adopted this method long ago, for I believe that this would lead to greatly improved carbonization. We are now able to obtain 11,400 cubic feet of gas per ton from North Staffordshire washed coal; and, when working experimentally with longer charges and full retorts, we have obtained 11,800 cubic feet per ton, of practically the same illuminating power.

The current for operating our machines is generated by a multipolar dynamo, direct coupled to a 36-H.P. "National" gas-engine, arranged to work with either crude blue water gas or town gas. The water gas costs 4·25d. per 1000 cubic feet, and is of 320 B.Th.U., as against an average of 620 B.Th.U. for the gas as delivered. The total cost of generating 7832 units for dealing with 29,625 tons (= 0·264 kilowatt per ton) during the year ending Dec. 31 last amounted to 1·07d. per kilowatt for attendance, repairs, oil, and sundries, and 0·83d. for gas; or a total of 1·90d. per kilowatt (0·51d. per ton with blue water gas, or with town gas, at 1s. 1d. per 1000 cubic feet, 0·74d. per ton of coal carbonized). This cost may seem somewhat high; but it must be remembered that the load-factor is extremely low, probably not more than 5 per cent., and that only about one impulse in five does useful work. On testing the machine with full load on town gas and water gas respectively, it is found, although the calorific power is practically one-half, that less than double the quantity of the latter is required for a given output (the ratio being about 175 : 100), and that under these conditions, during the short tests we have been able to make, the fuel cost (water gas) is under 0·18d. per brake-horse-power. The temperature of the explosion of water gas being higher, the diagram is higher than with coal gas; so that the explanation of the phenomenon may be that the heat losses due to conductivity of the inner walls of the cylinder are less. A thorough investigation of this subject would doubtless yield interesting results; but as our plant is not in duplicate, I do not care to undertake the risk of running for long periods under full load, and the greatest care has to be exercised in order to keep every part of the plant in the highest state of efficiency. Up to the present time, no serious breakdown has occurred.

On installing the stoking machinery, the next question to be considered was the most suitable means for removing the coke from the retort-house. Chiefly on account of the capital outlay which would have been involved, and the cost of maintenance and damage to the coke, it was decided not to use conveyors, but instead to utilize tipping waggons running on light rails laid along the discharging floor of the retort-house. This system possesses the advantage that it costs little to instal and maintain; and the labour item, in comparison with the old method of wheeling, is low. The following table gives the costs of carbonizing under the method formerly employed and that at present in use:—

Old Method. Manua Stoking Machines.	Pence per Ton.	New Method. De-Brouwer Stoking Machinery.	Pence per Ton.
Labour—Coal unloading, breaking, carbonizing, and delivery of coke to boats or carts . . .	24·00	Labour—Coal unloading, breaking, carbonizing, and delivery of coke to boats or carts.	15·25
Gas to breaker and elevator engines, oil, waste, &c.	0·68	Gas to breaker and elevator engines, oil, waste, &c.	0·68
Repairs to tools, barrows, &c.	3·28	Repairs to tools, waggons, &c.	2·00
Repairs and maintenance of breakers, elevators, and engines to ditto .	0·66	Repairs and maintenance of breakers, elevators, and engines to ditto	0·66
Repairs to machines . .	0·42	Repairs to "D.B." machinery and generating plant . . .	0·67
		Gas, oil, waste, &c., to generating plant . .	0·51
	29·04		19·77

Or a saving of 9·27d. per ton, which is equivalent to £1144 per annum. The average weight of coal carbonized is equal to 4·6 tons per man per shift of 8 hours, including all labour in and about the retort-house.

Some portion, however, of this saving is due to a new coke plant, which was also installed, whereby the waggons are elevated by a hydraulic hoist, so that the coke may be deposited in the storage-hopper, the coke-breaker, railway waggons, or in the coke yard by means of an overhead gantry. The cost of maintenance of the stoking machinery was 0·40d. per ton for the discharging machine, 0·185d. per ton for the projector, and 0·085d. per ton for the dynamo and switch-board—in all, 0·67d. per ton. The cost of renewals for the projector belt (included in above) was equal to 0·14d. per ton; the two belts used having dealt with an average of over 20,000 tons each. The projector is capable of dealing with equal facility with all kinds of fuel used at West Bromwich, varying from screened coal to small washed beans—a little experience enabling the men to manipulate the rheostat and so obtain perfect charges. Another satisfactory feature is the less wear and tear on the retorts than under the former conditions, which has already become apparent.

AUTO-CARBURATION OF GAS A FAILURE.

The subject of the auto-carburation of blue water gas by passing it through the coal-gas retorts is one which presents many attractions, and has been adopted at several works with varying degrees of success, depending largely upon local conditions. I have tried the process in many ways, but was reluctantly compelled to abandon it; and I am of opinion that no benefit can be obtained by mixing it with the coal gas at any point, unless its temperature is higher than that of the coal gas. Even under these conditions, it is doubtful if any real advantage accrues with ordinary horizontal retorts. Many proposals have been made with a view to completely gasifying coal in closed vessels by carbonizing bituminous coal and producing water gas from the resultant coke. The recent suggestion of Mr. J. T. Westcott, in which he combines a water-gas generator and inclined retorts heated by the products of the "blow," with a secondary air supply, appears to be a most feasible one. By such a method the yield of gas should theoretically be about 40,000 cubic feet per ton of coal, of approximately 5-candle power and 400 B.Th.U. Although such a gas would form an excellent diluent, and would in fact answer admirably for incandescent burners, it will be a long time before it will be distributed for the sole supply of any large manufacturing town in this country, though doubtless the tendency is in the direction of supplying gas carrying the greatest number of heat units at the lowest price to the consumer.

OIL GAS AS AN ENRICHER.

I am personally of opinion that the needs of the consumer are better satisfied by a supply of 14-candle gas regularly maintained than by one varying between (say) 15½ and 17 candles. In West Bromwich, although only 15 candles, as tested by Sugg's No. 1 "Metropolitan" argand burner, is prescribed by the Act, the illuminating power is kept at over 16 candles at the testing-station 1½ miles from the works, and the calorific power at over 600 B.Th.U. gross. In order to fulfil these conditions, only a limited proportion of blue water gas (of 320 B.Th.U.) could be used with benzol enrichment. Oil being an enriching medium of much greater calorific value than benzol, I decided to add to our Dellwik water-gas plant a retort-setting for the production of oil-gas on the Peebles system. The price of oil at the present time is somewhat high; but, even at 3¾d. per gallon, the carburetted water gas is decidedly cheaper than coal gas into the holder at the prevailing prices of coal. I may here state that the costs of water-gas manufacture (which, for this purpose, is treated as a separate department) are most carefully kept.

Table Showing Estimated Cost of Benzolized Water Gas and Carburetted Water Gas.

Benzolized Water Gas.	Water Gas Enriched with Oil Gas.
Benzol . . . . 160,000 B.Th.U. per gallon	Oil . . . . . 112,000 B.Th.U. per gallon
Quantity of benzol required to enrich 1000 cubic feet of water gas to 16 candles . . . . 0·59 gallon	Quantity of oil required to enrich 1000 cubic feet of water gas to 16 candles . . . 2 gallons
Thermal units added with enrichment = 94 B.Th.U.	Thermal units added with enrichment = 224 B.Th.U.
Water gas + Benzol vapour B.Th.U. B.Th.U. 320 + 94 = 414 B.Th.U. in enriched water gas	Water gas + Oil gas B.Th.U. B.Th.U. 320 + 224 = 544 B.Th.U. in enriched water gas
Cost of Enrichment.	**Cost of Enrichment.**
0·59 gallon per 1000 cubic feet at 10d. = 5·9d.	2 gallons per 1000 at (say) 3¾d. = 7·50d. Fuel for making oil gas . . 0·23 7·73d.
Volume of gas added with 0·59 gallon benzol = 24 cubic feet	Volume of gas added with 2 gallons of oil = 200 cubic feet
Present cost of benzolized water gas per 1000 feet = 11·02d.	Estimated cost of oil gas + water gas = 11·93d.

Under the above conditions, assuming the coal gas to be 640 B.Th.U., if the mixture be maintained at over 600 B.Th.U. 15 per cent. only of benzolized water gas could be used, whereas 40 per cent. of water gas enriched with oil gas might be employed.

Unfortunately, our oil-gas plant is not of sufficient capacity to gasify 2 gallons of oil per 1000 cubic feet of water gas made. But the enriching value of the oil is higher than I anticipated—namely, 8½ candles per gallon per 1000 cubic feet; the remainder of the enrichment being obtained by the use of benzol. I am now making some experiments in the hope of still further increasing the enriching value of the oil by introducing highly-heated water gas into the oil-gas retorts and seal-tank, and have already obtained an equivalent of 110 cubic feet of oil gas per gallon—the usual yield being from 80 to 90 cubic feet per gallon. Although oil as an enricher serves the purpose well when it is desired to add to the calorific power, yet, when only the addition of candle power is required, I am of opinion that benzol is much cheaper and infinitely more convenient. It is true that benzol enrichment is looked upon by many with distrust; but I think the following table will show that, when it is properly vapourized, the enrichment is, for all practical purposes, permanent:—

—	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.
Works tests	16·98	16·97	17·07	17·12	16·70
Gas examiner's tests 1½ miles from works	16·56	16·61	16·71	16·82	16·36
Difference	0·42	0·36	0·36	0·30	0·34

Average of Five Years.

Works tests . . . . . 16·96-candle power
Gas examiner's tests . . . . . 16·61 ,, ,,

Difference . . . . . 0·35-candle power

Some of the difference shown above may be accounted for by the fact that the Harcourt 10-candle pentane lamp is used at the works and candles at the testing-station. The carburettor employed is that of Messrs. Young and Glover. With a view to more perfectly vapourizing the benzol, a condenser was added in 1902, consisting of wrought-iron tubes containing baffle-plates and spirals. By this means the benzol vapour, which is carried by an amount of coal gas equal approximately to 10 per cent. of the total make, is reduced to a lower temperature than that of the main stream of coal gas at the point of mixing; so that if the vapour survives this treatment it is less likely to condense subsequently. Except in very cold weather, no benzol is found in the syphons in any part of the works or district, and then only in minute quantities. A similar, but much smaller, carburettor is fixed at the inlet to the scrubbers; and a small quantity of mineral oil is periodically vaporized in this for the purpose of removing the naphthalene. Though the crude gas often contains large quantities of naphthalene, yet, by a judicious use of this simple apparatus, none is deposited in the solid state, either on the works or in the district. The following table shows the quantities of benzol used for enrichment and of petroleum employed for naphthalene extraction during the year ending March 31, 1906:—

Gas Made. Cubic Feet.		Coal Gas per Ton.	Average before Enrichment.	Illuminating Power after Enrichment.	Added by Enrichment.
Coal gas. .	312,538,000	11,354	..	..	..
Water gas* .	30,432,000	..	13·20	16·70	3½ candles.
Total .	342,970,000				

* Water gas = 8·87 per cent.

Benzol per 1000 Cubic Feet.	Petroleum per 1000 Feet.	Benzol used per Candle per 1000 Cubic Feet.
0·133 gallon.	0·0091 gallon.	0·038 gallon.

DISTRIBUTING AND UTILIZING GAS.

This address would be sadly incomplete without some reference to the subjects of the distribution and utilization of gas, which are to-day even more important than at any previous period of the history of gas. The old aphorism of keeping the pressure in the district as low as possible, no doubt, held good in the days of flat-flame lighting; but, with the passing of the flat-flame burner, it must also be relegated to the past. In order to meet the needs of modern incandescent lighting, the tendency is to increase pressures all round—in fact, there are many advocates of distribution under high pressure. Owing to an inconvenient arrangement of the mains, many of which are very old, and also to considerable variations in the levels of different portions of the borough, the maintenance of equable pressures in all parts of West Bromwich is a matter of much difficulty. For the adequate supply of one outlying district, nearly 5 miles distant from the works, the level of which is 50 feet lower, I have recently installed a pressure-increasing apparatus, consisting of a fan operated by a small water-motor, which is started and stopped automatically by an equilibrium water-valve connected to the bell of a small governor, which rises and falls according to the prevailing gas pressure. The power required is under ¼-H.P.; and the fan is capable of raising 12,000 cubic feet of gas per hour from 15-10ths to 25-10ths. By the fixing of an auxiliary water-jet to the motor for momentarily increasing the outlet pressure still more, it is hoped to automatically light and extinguish the street-lamps for a distance of nearly 2½ miles.

With regard to this subject, after having tried several clockwork systems I found that they are unsuitable for use in manufacturing districts like West Bromwich, where the atmosphere is vitiated, and has a bad effect upon the delicate mechanism. We now have in use in another part of the town that type of apparatus which is worked by a temporary increase in pressure; but on several occasions the extra pressure put on at the works accumulated to a sufficient extent to blow the seals of consumers' meters. This difficulty was overcome by employing a district governor, the bell of which is depressed for a few seconds, in order to light or extinguish the lamps. It is not found necessary to increase the pressure at the works for this purpose, as at the inlet of the governor this amounts to about 32-10ths at lighting-up time, and 28-10ths at extinguishing time; the governor being

set for an outlet pressure of 20-10ths. The wet meters in use in the higher portions of the district are being altered so as stand a pressure of 6 inches, in readiness for future requirements in this direction.

In spite of competition, the use of gas for motive power continues to increase in West Bromwich, and now aggregates over 2000 B.H.P.; the prices of gas used for this purpose being from 1s. 5d. to 1s. 10d. per 1000 cubic feet, subject to 5 per cent. discount. Gas-engine users frequently encounter trouble with their engines, which they have much difficulty in getting rectified; the usual information offered to them by the makers of the engines is that the gas supply is "bad." We find it of advantage to render them every assistance, and, if necessary, to undertake the testing and indication of their engines—a service which I believe is much appreciated. The limitation of oscillation is also an important factor in the satisfactory running of gas-engines, and should be insisted upon. In no case is this permitted to exceed 4-10ths in West Bromwich.

Considering the enormous amount annually spent on artificial lighting, it is singular what little attention has been given to the study of the subject. It has been recently proposed to form an Illuminating Engineering Society in this country, on similar lines to those of the Society which has existed for some time in America. But as the attention of the latter appears to be directed principally to the consideration of the best methods of electric lighting, the project is not likely to be looked upon with favour by British gas engineers, who are responsible for a much greater proportion of the artificial lighting in this country than their *confreres* are in America, and are making a closer study of this subject than formerly. There is cause for much satisfaction in this, as it is one of which the general public is surprisingly ignorant—a fact not to be wondered at, as it unfortunately has so often been left in the hands of those who do not possess the knowledge or experience which is necessary in order to qualify them to advise consumers. It is for this reason that it is desirable that the local gas undertaking should always endeavour to obtain the control of this important branch of our business; and, with this object in view, most up-to-date concerns have in operation some system for the maintenance of consumers' burners. In West Bromwich the process of burning-off and seasoning mantles for this purpose, as well as for street lighting, has been adopted with results most satisfactory to the consumer, as well as less cost to the Lighting Department; 1s. per burner per annum being found sufficient to charge for churches, schools, and other public buildings.*

Recent improvements in inverted burners and lamps have brought them to such a state of perfection that they are likely to seriously compete with many of the systems of high-pressure lighting—indeed, the efficiency obtained by many of them very nearly approaches that of the latter. Such lamps, being less costly to instal and maintain, can be profitably employed for street lighting, and if fixed at a suitable height above the road, give a most excellent illuminating effect.

I believe that there are many possibilities of extending the uses of gas for purposes other than those of lighting, cooking, and power. For instance, it may be employed with advantage in many manufacturing processes—such as core-drying, tempering, glass blowing, &c., and it is most desirable that such opportunities should be systematically cultivated.

There are many other such matters to which I should have liked to refer; but I fear that I have already trespassed too much upon your patience, and laid myself open to the accusation that I have attempted to cover too much ground, and have dealt with many important matters in too superficial a manner. But my purpose will have been amply fulfilled if I have suggested to the minds of any members present any subject with which they would be prepared to deal in a more thorough manner at some future meeting.

Mr. J. Ferguson Bell (Derby) said he felt sure they would wish to accord to Mr. Copp a hearty vote of thanks for his illuminating and practical address, which was one of the best presidential addresses he had ever had the pleasure of hearing. The President had brought before them, in a very practical manner, many subjects that required their attention. He was struck with his remarks on the De Brouwer machinery; and he thought they must congratulate the President upon its introduction, which enabled him to produce so large a quantity of gas per ton of coal carbonized, and at the same time reduce his carbonizing costs by about one-third. He was surprised to hear that water gas, with oil at 3¾d. per gallon, was cheaper than coal gas. It was very satisfactory to learn that, with benzol enrichment, there was only a loss of ⅛-candle between the gas-works and the official testing-station 1½ miles away. He thought, however, a most interesting part of the address was where the President drew attention to the commercial side of their business. It was not only necessary for them, as gas managers, to sell good and cheap gas, but it was also necessary that they should pay due attention to their consumers to enable gas to keep its place in competition with both electricity and suction gas and other power methods. The figures the President quoted would enable them to meet the statements that were often placed before them by those who had power plants to sell, in which they stated how cheap it was to introduce suction gas. Unfortunately, in making these statements, as the President showed, the sellers of these plants only took part of the cost into consideration. There were many good points brought forward in the address, and in a way which they would all be able to further peruse with interest and pleasure.

Mr. T. Glover (Norwich), in seconding the vote of thanks, said it afforded him much pleasure to be present to hear the address. He congratulated the West Bromwich Corporation upon having secured Mr. Copp's services. He could not have had a more pleasant or more worthy successor to carry on the duties which he (Mr. Glover) at one time carried for the West Bromwich Corporation. Therefore he valued this occasion to acknowledge both Mr. Copp's courtesy, and the great ability he had displayed in the fine address he had given them. He quite endorsed the remarks of Mr. Bell as to the scope of the address, and the importance of the figures that had been quoted, both as to the cost of manufacture and on the commercial side of the undertaking, neither of which could they afford in these days to neglect. The commercial side became of increasing importance; and maintenance was certainly a question of policy to which he, as Mr. Copp did, attached great value. He was glad Mr. Copp had taken it up in West Bromwich, and succeeded so well.

Mr. George Helps (Nuneaton) and Mr. Pooley both supported the motion, which was endorsed by acclamation.

The President, in reply, said he was extremely obliged to the members for their cordial reception of what he was afraid was rather a feeble effort. He felt he had dealt very superficially with the points he had raised; but it occurred to him that, after all was said and done, a President should necessarily be superficial. A President should really be, in his address, more suggestive than anything else. That was what he had aimed at; and if he had attained any measure of success, he was more than gratified. He was much obliged to Mr. Bell and Mr. Glover for the kind remarks they had made, because, coming from such old members and members of such experience, he felt they had paid him an extremely high compliment.

The Association's Roll of Honour.

The President said he had to announce the election of certain gentlemen as honorary members. The names of these gentlemen were brought before the Committee, and were unanimously accepted; and he was sure the action of the Committee would be cordially endorsed by all the members. The names were Mr. Charles Hunt, of London; Mr. John Tindall, of Walsall; Mr. William North, of Paignton; Mr. W. R. Cooper, J.P., of Banbury; Mr. G. Winstanley, of Kenilworth; and Mr. John West, of Southport. It was interesting to note that the first three gentlemen were the founders of the Association. He believed he was right in saying that Mr. John Tindall first suggested the formation of the Association, and with him were associated Mr. Hunt and Mr. North. The date of the first meeting was Oct. 11, 1877; and the first annual meeting was held on Jan. 10, 1878, at which Alderman Cooper and Mr. Winstanley joined, and Mr. John West was elected at a subsequent date. He thought the members would agree with him that in electing these gentlemen as honorary members they would be honouring themselves.

The action of the Committee was heartily confirmed.

Mr. B. W. Smith (Walsall) said he should like to express, on behalf of Mr. Tindall, the high sense of pleasure and appreciation with which that gentleman received from the Hon. Secretary the intimation of his selection as an honorary member. Mr. Tindall had the interests of the Association at heart; and even to this day, feeble as he was, he always inquired after his old friends and the progress of the Association. In expressing Mr. Tindall's gratitude to the members for this mark of esteem and appreciation, he (Mr. Smith) was only doing his duty.

Mr. William North, who was present, was received with cheers. He said he was extremely grateful to the members for the honour they had conferred upon him. He had, it was true, something to do with the formation of the Association; but he did not think there would be any harm in correcting one little mistake the President had made. The first move in the formation of the Association was taken by Mr. John Annan, Mr. Collett, and himself; and they waited upon Mr. Charles Hunt at Windsor Street, one Thursday afternoon, to ask him if he would give them his influence and support. Then friend Tindall came in. That was how the matter stood. Personally, he had not been able to do much for the Association. But he had willingly done what he could, and as well as he could. He did feel extremely thankful and grateful for the honour conferred upon him. His old friend Cooper was a good companion of those early days; and he would perhaps tell the members a little more.

Alderman Cooper was also greeted with cheers. He said he hardly knew how to express his appreciation of the honour conferred upon him. He felt it very deeply indeed; and he did not think any words of his could express the inward feelings he had at that moment. Great changes had taken place since he attended the first meeting. He appreciated greatly the kindness that had always been shown him in every stage of his progress in the Association. He had been through all the various offices right up to the presidential chair; and as he stood there that day, he was surprised that he was still living among the members. He thanked them one and all for the kind manner in which they had received

* Mr. Glover asked what this figure of 1s. included; and the President replied glass, mantles, &c. Attention was given to the burners once a month or as often as necessary.

him. His interest in the Society would not be lessened one atom by becoming an honorary member.

The HON. SECRETARY said he had received a telegram from Mr. Hunt, saying how greatly he appreciated his election as honorary member, and assuring the Association of his continued regard. He also had a wire from Mr. West to the same effect; and Mr. Winstanley wrote acknowledging the honour conferred upon him, and also assuring the members of his continued interest in the Association.

The PRESIDENT said he had much pleasure in asking Mr. Fletcher W. Stevenson to open a discussion on the subject of stoking machinery. It was a question he had referred to briefly and superficially in his address; and, moreover, it was a subject of great interest to every member.

Mr. F. W. STEVENSON (Coventry) read the following

NOTES ON STOKING MACHINERY.

Perhaps some apology is necessary from me for offering to open a discussion upon such a worn, I might almost say threadbare, subject as stoking machinery; but when our President told me two weeks ago that he had failed to obtain a paper for this meeting, the subject of stoking machinery came uppermost in my mind, perhaps because I have had very recently to decide what machinery to adopt for the new works I am now constructing at Coventry, and which are nearing completion. Afterwards I wondered at my temerity. But when we consider that the retort-house and its equipment in our days take upwards of a fifth of the capital expenditure of a new works, and in labour account for about 50 per cent. of the wages bill of running a works, the importance of the subject is at once apparent.

I think a proper definition of stoking machinery may be taken as "any form of mechanical appliance for charging or discharging retorts," and, if so, embraces machines for horizontal, inclined, or vertical retorts. The machinery for working inclines and verticals is, of course, on a very modified form, and, indeed, for verticals consists of little else than conveyors and hoppers. So that if verticals become a success in this country—which seems more than likely—the machinery in connection with them will be of the simplest. I am not competent to discuss machinery for verticals, because I must confess that I have not seen a single installation, and therefore must leave it to other members to do so. I may mention in connection with the subject, however, that very early, when I was considering the type of retorts to adopt for our new works at Coventry, one of our members suggested to me that I had a great opportunity for using verticals, as I could, starting *de novo*, build a house suitable for them, and show what could be done by them. But I suppose I had not sufficient pluck to take what seemed to me the enormous risk of putting down an installation to produce 4 million cubic feet of gas a day; and so I decided in favour of horizontal retorts with stoking machinery, which, I believe, in results will compare favourably with any similar sized installation of inclines. I was led to this decision by a very carefully kept record of the wages bill for working horizontals and inclines at Coventry. The following are the figures for the last financial year ending March 31, 1907.

Hand-Stoking Horizontals.

	£	s.	d.		Per Ton. Pence.
Foreman stokers (proportion)	303	8	10	..	1·27
Stokers	4401	6	11	..	18·47
Coal wheelers	782	7	4	..	3·28
Coke ,,	1569	4	1	..	6·58
Pipe jumpers (proportion)	209	0	6	..	0·88
Removing pan ashes	245	8	8	..	1·03
Boiler and engine tenters (proportion)	218	14	5	..	0·92
Coals carbonized, 57,190 tons	7729	10	9	..	32·43

Inclines.

	£	s.	d.		Pence.
Foreman stokers (proportion)	74	13	5	..	1·27
Stokers	1125	0	2	..	19·19
Coal elevator men	112	15	11	..	1 92
Pipe jumpers (proportion)	51	8	6	..	0·88
Removing ashes	7	16	1	..	0·13
Boiler and engine tenters (proportion)	53	16	1	..	0·92
Coals carbonized, 14,070 tons	1425	10	2	..	24·31

A saving in favour of inclines of 8·12d. per ton.

Both horizontals and inclines are heated regeneratively. The horizontals are shovel charged; and coal is wheeled from the stores and the coke wheeled to the coke yard. The inclines are, of course, supplied with coal by elevators, raised into overhead hoppers, but the coke is wheeled into the coke yard. It is only fair to say that the inclines are of a very early type, with contracted mouthpieces, giving a good deal of trouble in discharge of the coke. But the comparison is a very fair one, because the drawing and charging of the horizontals is a relict of the early days of gas making; the charging being entirely by shovel. A saving of 8d. per ton is not to be despised. But the results obtained at Coventry with inclines can be easily beaten with horizontals and modern machinery; and in cost of labour there is now nothing to choose between the best-equipped horizontals and machinery and the most modern inclines.

I am quite aware that this is a debateable point, and doubtless many members will not agree with me. But if I am right, or even approximately so, then stoking machinery, as applied to horizontals, is a more interesting subject than ever, and to-day I maintain that machinery may be obtained suitable to every description and every size of retort-house. To take the smallest sized works. There is the "Rapid Charger" of Messrs. Biggs, Wall, and Co., which consists of a runaway track supporting a pair of chain blocks for raising the scoop into position for driving into the retort. This little machine converts the shovel stoker into a scoop hand, and, consequently, gives a better-laid charge in the retort with a proportionately higher yield of gas. It may not effect a great saving in the wages bill—and I have never seen any record stated of this—but it is an advantage to use a scoop, both because the latter does not require a trained man which the shovel does, and on account of a more evenly-laid charge resulting in a better yield of gas.

We have next the West manual machines, with which you are all familiar. They have been used in many works of a size not large enough to warrant power machinery. I do not know how much of the advantage of these machines is due to the mechanical hauling of the coal by elevators, and how much to actual reduction of labour in drawing and charging; but a portion no doubt is due to each cause. Again, with this machine a scoop does the work of a shovel; and, of course, does it better, and with a consequent increase in the yield of gas.

The best result that I know of obtained with these machines for labour in carbonizing was stated by Mr. J. C. Belton, of Chester, in the discussion on Mr. Edward Allen's paper on the Fiddes-Aldridge machines before the Institution of Gas Engineers. Mr. Belton stated then that his labour costs were 1s. 2·93d. per ton of coal carbonized, as against 2s. 4·17d. per ton with shovel stoking. In the earlier days of the power-stoking machines, there were practically only two successful types, represented by West's rope and compressed air driven machines and the Arrol-Foulis hydraulic machines. Great diversity of opinion exists as to the advantages of each, and especially as to the motive power. My own experience of rope-driven machinery has been very satisfactory when cotton driving ropes were used; but wire ropes I found have proved an absolute nuisance, due to their continual breakage. At the same time it is fair to say that others—notably Mr. Joseph Tysoe, of East Greenwich—speak highly of the wire-rope drive. Compressed air as a motive power for a travelling machine is very far from ideal. In addition to the mechanical loss due to compressing, a great strain is put upon the hose-pipe, due to it being drawn off the weighted drum as the machine travels away from the point at which the drum is fixed, and leakages of air soon occur. Moreover, the hose-pipe is costly to renew. But apart from this, the West compressed air machines are sweet and rapid in work, and excellent results have in many places been obtained with them.

In my address to this Association two years ago, I gave the figures of saving effected by the use of the machines at Sheffield as nearly 1s. 1¾d. per ton over scoop hand stoking, and a net saving of nearly 8¼d. per ton after allowing for upkeep, repairs, interest, and depreciation. At the same meeting, our friend Mr. J. T. Lewis gave results of his costs over 18 months in working, at Wellingborough, West's compressed air combined charging and drawing machine; the average cost of labour for carbonizing being 1s. 5¼d. per ton—about the lowest cost that I have heard of. It must not be lost sight of, however, that this figure applies to a new modern-equipped works, complete with hot-coke conveying machinery and with stokers working twelve-hour shifts. If it is true that compressed air is not an ideal motive power for travelling machines, it is certainly equally true of hydraulic power. In the latter case, there is constant uncoupling and coupling-up of the pipes, with the attendant mess and slop inseparable from such an operation; but it is almost a perfect power for use with the rams operating the drawing and charging. I think, however, there is no doubt that on this side of the border the Arrol-Foulis machine has not been really popular. For one reason, we like a scoop-charger; whereas the Arrol-Foulis pushes the charge in bit by bit, and the drawing-rams, though very suitable for the non-coking coals of Scotland, were not, at any rate in the earlier machines made, strong enough for English coals. I have never seen any published results of the working of these machines.

A complete revolution in charging-machines has been effected with the introduction of the De Brouwer projector, the first of which in this country being that seen by this Association at Mr. Smith's works at Walsall. The first, however, in actual practical work was that installed by Mr. Bell at Derby, and of which he gave the working results on six beds of eights in a paper to the Institution of Gas Engineers in 1904. In this, he stated the cost of wages for carbonizing with the De Brouwer projector and discharger was 1s. 0·4d. per ton of coal, to which he added 15 per cent. on the cost of machinery for interest, repairs, and depreciation, equal to 3·4d. per ton, and for oil waste, gas for engine, &c., 0·73d., or a total of 1s. 4·53d. per ton—a result that has been borne out by Mr. Auchterlonie at Cambridge. It is probable that these figures have been beaten since in larger installations where the machines have been more fully employed. It is a very fascinating system. A 20-feet through retort is charged one end with an even layer of coal, and discharged by being pushed out at the other. Naturally other makers of stoking machinery have taken up the idea, and now there are three makers, at any rate, of projectors and pusher-dischargers. I have had an opportunity of seeing Messrs. Robert Dempster and Sons' at Falkirk, and Messrs. West's at Bristol; and both appear to work very well

The costs of working with the different varieties of projector machines cannot vary much, except due to local circumstance.

There is one point about these projectors which must not be passed by. In electricity, was introduced into gas-works for the first time a new motive power. The use of the trolley wire makes this an ideal power for all travelling machines; and provided the electric motors on the stoking machines will remain in good order in the heat and dust of a retort-house, it gives a flexibility without which projectors cannot be used. It gives, too, another great advantage in being able to show our consumers how they can generate electric current at a far cheaper rate than it can be supplied from a central generating station. I think we should be careful, however, not to use it for purposes for which gas-engines are equally applicable, and at a cheaper rate. For instance, can there be a greater absurdity than driving a gas-exhauster or a workshop plant in a gas-works with an electric motor, where the power required is practically constant, or at any rate, easily within the variation obtained by a gas-engine?

Infinite credit is due to Messrs. Robert Dempster and Sons for having devised a rope-drive for projector stoking machines that will give all the flexibility hitherto only obtainable by an electric motor. This drive consists of an endless cotton rope running at an uniform speed and transmitting power to two pulleys whose diameter is relatively varied at will by means of one lever while the rope is running at full speed, combined with differential gear so familiar in the axle of motor-cars. When the diameters of the two rope pulleys are the same, the countershaft is stationary; but as soon as one rope pulley is increased in diameter and the other decreased, the differential pulleys run at a different speed, and the countershaft rotates—the speed being increased as the difference in diameters of the rope pulleys increases. If the rope pulleys are now reversed in diameters, the larger one being made the smaller, the differential wheels also change speed in proportion, and a reverse motion is given to the counter. With one lever simply controlling the diameters of the rope pulleys, a motion can be given to the counter from neutral to maximum forward or maximum reverse. There is no new motion employed in the system, but only a very clever combination and adaptation of two motions already separately in use for other purposes. I have a model here, which will no doubt interest you very much.

I have only one more stoking machine to refer to, and that is the Fiddes-Aldridge. It has already been fully described by Mr. Allen, of Liverpool, in his paper to the Institution of Gas Engineers, in 1906; but it is unique at present, in that it is the only machine that pushes the coke out of the retort at the same time that it is putting the fresh charge of coal in. Thus where a few years ago we required four machines (two charging and two drawing), with four men, to operate 20-feet through retorts, now we can do the same with one machine and one man. Whether the retort will be as well and evenly charged with this machine as by the scoop I am not prepared, from personal experience, to say; but I expect to have two of the machines at work during next winter, as I believe the advantage of cost of working will far outweigh the slight disadvantages I foresee this machine has compared with the scoop machine. Mr. Allen gave the labour costs of carbonizing with the Fiddes-Aldridge machine as 1s. 8d. per ton, but hinted that with the next machine he was putting in, with improved conditions, this figure might be reduced to 10½d.; and I see no reason why this should not be so.

Whether vertical retorts will in the future be such a success that both horizontals and inclines will be considered obsolete, it is impossible to say; but anything and everything that enables us to reduce the cost of manufacturing gas will always be welcomed. But no sweeping change can be expected in existing retort-houses until the new systems, however promising they appear, have been fully tried and perfected, because of the enormous amount of money sunk in the carbonizing plant of gas-works.

[On the table was the model showing the Toogood rope-driven machine, which before and after the meeting was inspected with considerable interest. The ingenuity of the novel combination of well-known principles was much admired.]

Discussion.

Mr. J. Ferguson Bell (Derby) said Mr. Stevenson had referred to the De Brouwer projector, and rightly said that the invention of this simple contrivance for charging retorts by means of projecting coal from a revolving band lent new interest to stoking machinery. It enabled much smaller works than heretofore to introduce power machinery. Other makers of machines saw that there was this new market if small-sized works went in for power machinery; and they set to work to improve on the De Brouwer. Whether they had made any improvement, only time would tell. There were no doubt now a number of most economical power machines which it would pay managers to introduce, if they had sufficient work for them to do. For very small works, he had found the hand machines required a lot of beating yet; but where they had a large house, power machinery, with the necessary coal and coke handling plants, would well pay to introduce. His experience had been solely with the De Brouwer machines; but he had, by the courtesy of the Engineers, been to Liverpool and seen the Fiddes-Aldridge machine, and to Bristol to see the West machine. They all appeared to be doing good work. It was now about five years ago that he went over to Bruges to see what M. de Brouwer was doing at his works. He (Mr. Bell) afterwards recommended his Board to put in a trial installation of the De Brouwer machinery; and since then they had put in two other installations, which would indicate how well satisfied they were with this type. The reason he liked the machine was on account of its simple working, and because the coal could be put into the retorts in either a thick or thin layer. Many years ago, when he was at Birkenhead, it was a maxim to put in light charges and of short duration. Until lately he thought that was the proper way to carbonize. With the De Brouwer machines his experience was that with light charges and short duration they had stopped pipes. He had now increased the weight of the charge and the length of duration. They put in 7½ to 8 cwt. of coal, and increased the duration of carbonizing up to eight hours. The result was a larger make per ton, and freedom from stopped pipes. It occurred to him, Why stop at eight hours? And they were now experimenting at one of their works on charges of different weights and periods. He hoped at some future time to give the Association, or some other body, the results of the experiments. In his opinion, they had a great deal to learn about carbonizing. Last autumn he was on the Continent, and took the opportunity of seeing the vertical retort. The primary object of the visit was to advise his Board whether they should put in vertical retorts, as they had a retort-house they were remodelling. This was a 2 million feet house; and, as Mr. Fletcher Stevenson told them, with a 4 million house, he could not make up his mind to go in for verticals. Neither would he (Mr. Bell) take the risk of recommending so large an installation. He must confess he was not yet convinced on the question as to why they should have so much better results from carbonizing coal placed vertically than placed horizontally in a retort. If they filled a horizontal retort, it seemed to him they should get almost the same results as from a vertical retort. These remarks did not apply to the Woodall-Duckham system, because in that case it was continuous carbonization, and the conditions were not the same. With the Dessau vertical retort, it seemed to him the conditions were very similar, only one was horizontal and the other vertical, if both were filled up. This he could say, that, with heavy charges of eight hours' duration, they were doing very well indeed with horizontals. They were getting a larger yield of gas per ton and of a higher candle power; and the works' costs were down. As to carbonizing costs, he always hesitated to give figures, because, unless carefully explained, they would be fallacious—so many people including dissimilar items in carbonizing. If they quoted figures at all, they should be the costs from the deposited coal to the coke bank, leaving out all other charges. Their costs at the present time, working the De Brouwer machine, was just over 1s. per ton. This included the men's time working the machines, 10·2d. per ton; firemen's wages, 1·27d.; and men attending to the tar columns and stopped pipes, 0·76d.—making a total of 12·23d. This did not include any foreman's time or anything for supervision. It was simply taking the coal as deposited on the works to the coke wheeled out to the bank. They had no coke-conveyor, and the coal was carted into the works very near to the retort-house. The men operating the machines had to deal with the coke into the breaker. The cost was fairly low; and no doubt they would be able to reduce the costs still further at the Litchurch works. To those managers who were in charge of the smaller and medium-sized works, he might say that, when they got down to four through beds, there was no economy as against hand labour. There was one matter to which he thought Mr. Stevenson did well to call attention; and that was the introduction of electricity in gas-works. He (Mr. Bell) had tried to keep it as low as possible, because he did not think they ought to give their electrical competitors gratuitous advertisement. Where there was a machine travelling about, such as a stoking machine, they had to convey power to it, and there was no doubt that electricity, by means of trolley wires, was a convenient way of doing it. But for a coal or coke conveying plant, a gas-engine was a very economical and successful method. He was surprised to see in some gas-works the amount of electricity that was in use. With reference to Coventry, the figures that Mr. Stevenson gave showed a saving of 8d. for inclines over hand stoking; but he did not tell them what was the result in make per ton of coal carbonized and in illuminating power—inclines compared with horizontals. There was no doubt that the vertical retort was very fascinating, and that it reduced labour charges to almost the minimum. But labour charges were not everything. He found that, going into the figures, the costs of installing the Dessau system at Derby would be almost prohibitive; it would be much more than horizontal retorts and machinery—indeed, it would be double the cost. Mr. Paterson reminded him that he had asked Mr. Stevenson a question regarding inclines and hand stoking, but had not given similar information regarding his horizontals with De Brouwer machinery and hand stoking. He had not the exact figures with him; but with the De Brouwer machine they had an increased make of gas of a slightly higher illuminating power. But he could definitely say this, that they found the coke made from coal charged into the retorts by the De Brouwer machine was very much improved compared with hand labour. The Secretary of the Company came to him on one occasion, and complained about the quality of the coke produced at one of the works, and wanted to know if there had been any change in the coal. There had not been; but what had been done was that the De Brouwer machine in one house had been put out of use for repair, and hand labour had been temporarily resorted to. The De Brouwer machine packed the coal into the retorts, and made the charge denser than by other systems of charging.

Mr. T. GLOVER: Will Mr. Bell or some other gentleman who is working eight-hour charges give us his make per mouthpiece?

Mr. BELL: The effect on the make per mouthpiece is slightly less—not much. We are charging nearly 1 cwt. per foot length; and the make per mouthpiece, with retorts 9 ft. long by 21 in. by 15 in., is 5500 cubic feet.

Mr. R. O. PATERSON (Cheltenham) was brought to his feet by the invitation of the President, and the appeal of several members; and he explained his reticence in responding by saying that the fact was he felt he, like his carbonizing plant, was getting a bit ancient. He used to think his works were fairly modern; but he thought if anyone who went into them now, and saw the system as modernized in 1883, he would confess that it was somewhat antiquated. But there were certain points one had to keep in view. They had a practical question to solve; and he had such a question to solve in 1883, or perhaps it was 1885. He then put in West's manual stoker; and it had been in use ever since, and was the system exclusively in operation on the works that day. When he put the system in, it was a considerable improvement on the old hand-stoking arrangement. He was bound to make this remark in consequence of a note to which Mr. Bell had given expression in reference to light charges of short duration. In those days, they had to look to an element in the gas which to-day had not the same weight or importance—namely, the illuminating power of the gas. The object of carbonization in those days was simply and mainly to get from the coal the largest yield of gas of the required illuminating power without the use of enriching material, which at that period was exclusively cannel, and was then expensive and not easily obtained. In these days, the conditions had quite altered. The illuminating power—and this would undoubtedly be universal in the country before long—had considerably dropped. Therefore the question of short charges was necessarily open to review. The short-hour and light charge was with the object of getting the largest yield of gas of the highest illuminating power. Now the important thing to do undoubtedly was in the direction of a heavier charge, saving labour, and producing gas of the lower quality applicable to the present time. It was a question of cost in both cases. If they had to compare his working at Cheltenham with the working of Mr. Bell with the De Brouwer plant, the members would say to him (Mr. Paterson) "You, of course, are not in it in cost of carbonization." He had not his figures with him; but he thought he was right in saying that the cost of his carbonizing for the year 1907, which included all the work done in the retort-house, coke yard, exhauster men, boiler men, coal breaking and wheeling—in fact, everything from the deposit of the coal into the yard—amounted to 2s. 2d. per ton. He was mentioning this figure from memory. But that seemed high compared with Mr. Bell's shilling. His form of carbonization, however, was much more perfect than with the De Brouwer charger. The coal in his old-fashioned arrangement was deposited lightly and evenly upon the floor of the retort. He considered that better results and better gas would be obtained from a condition of that sort than would be gained with the De Brouwer system; and though Mr. Bell made a point of packing the coal into the retort, better results could be got from the lighter than the heavier charge. Mr. Bell, however, extended the time of carbonization. He (Mr. Paterson) gave his charges five hours. What did Mr. Bell get? He told them that in his 9 feet length of retorts, 21 in. by 15 in., he obtained 5500 cubic feet per mouthpiece. Now in his (Mr. Paterson's) retorts, 9 ft. 4 in. by 22 in. by 16 in., he was getting over 8000 cubic feet per mouthpiece. Here they were not taking cost so much into consideration, but the result of carbonization. The whole object of carbonization nowadays was to reduce the cost of the article produced; but he did not attach a great deal of importance to the actual cost of labour in getting the work done. It could, of course, be considerably reduced in many cases on what was done at the present time. But he would always look to the result of the work. His own average make last year was 12,230 cubic feet per ton; and he got paid for over 11,600 cubic feet. If that was the result of his old-fashioned arrangement, he did not think it compared so badly. With all respect to the advocates of these new machines, he did not think that he had much encouragement to pull out his old benches and put in new ones. Nevertheless, he was erecting new plant now, and was arranging to put in power machinery; but he hoped members would forgive him when he said it was the old-fashioned scoop with at the end mechanical means of operating it instead of a man. What he felt certain in his mind he should put in was the combined machine of Mr. West, with the long scoop. With this power charger, the scoop went the full length of the retort, and it took in the coal, and laid it on the floor of the retort, and then the scoop came out. A more beautiful charge could not be conceived, and the lightness of the charge was an important factor. He was not desirous of throwing cold water upon any of the new machines. If, however, he were thinking of putting in any other machine than the one he had mentioned, he said with all respect—and the remark was not intended to be a nasty one—the last thing he should adopt would be the Fiddes-Aldridge machine. He had not seen it working; and he had only studied it from the diagrams and so on. But he thought the very fact of putting the chain into the retort, and pushing out the coke the other end, taking the coal in at the same time, and putting it down at once, was a most objectionable way of working. They all knew that retorts required a good deal of attention. How were they going to see if a retort wanted attention, unless they put the machine out of action, which would be an objectionable thing? The point he wanted to make was that they must not lose sight of the object of carbonization. That had to be considered as well as the cost of carbonizing the material.

Mr. T. GLOVER (Norwich) remarked that discussions on carbonization were of extreme interest. They had had from the last speaker at all events some ripe experience to which they must give great attention, and which they must treat with great respect. But it was difficult to make complete comparisons. Mr. Bell said he was using unscreened coal; but if they asked Mr. Paterson what he was using, he would probably say the very best screened coal he could get.

Mr. PATERSON: About half and half.

Mr. GLOVER said he took it it did not do to take dirt to Cheltenham; but it might pay to carbonize poor coal at Derby. It was very difficult to compare two works. But he thought the make per mouthpiece was an important factor. The extension of the period of carbonization, too, was extremely interesting from the point of view that it got over all difficulties with regard to stopped pipes, altered the character of the tar, improved the quality of the coke, and so forth. But he thought it was going to have its effect on the quantity of gas made on a given area. In his own works, working with the old-fashioned class of machinery that Mr. Paterson had decided to put in, they went on for long periods making 9000 cubic feet per mouthpiece; and the cost of carbonizing was not more than Mr. Bell's with the De Brouwer machinery—that was, with compressed-air combined scoop machinery. But there was no doubt that those gentlemen who were using the De Brouwer machines were making a better class of coke than others could do who were employing power rakes for pulling out the coke. But there were no perfect things in this world. There must be some disadvantage somewhere; and those who were using De Brouwer machinery, and employing heavier charges, were gaining tremendously by the quality of the coke. Mr. Stevenson had given them a pretty good review of the different classes of stoking machinery. But he (Mr. Glover) could tell them of a machine Mr. Stevenson had not yet heard of, and which was going to put in a charge 3 feet deep. The machine was erecting at his (Mr. Glover's) works at the present time. The retorts were to hold a ton each, and there would be six retorts in a setting. He could not say what would be the duration of the charges and the make per mouthpiece, cost of carbonization, or anything else. It was there; and it was going to be an extremely interesting experiment, and probably much more than an experiment. It would be the very opposite from what they were doing now; and it would give them the nearest approach to anything that had been done in a gas-works to carbonize in bulk with probably very low carbonizing costs as to wages, and extremely high quality coke. It was only carrying this question of size of charge and duration of carbonization a step further. Mr. Bell, their President, and several other gentlemen were using the De Brouwer machinery; and one after another had found it an advantage to go to eight-hour charges and as big charges as they could get in—8 or 9 cwt., and had found certain advantages. It seemed to him that, following what these gentlemen were doing with the machinery that was available, they were no longer tied to the old forms of retort, which were decided upon consequent on the means they had at hand for charging and drawing. The means that were available for charging and drawing to-day were altogether different from what they were when D, oval, or circular-shaped retorts were decided upon. There was no reason why they should stick to those shapes, and with the adoption of the De Brouwer machines, and an addition to it, they could charge a deeper retort—say, 3 feet deep, and 12 inches wide; and they could push out the charge, as was done in coke-oven practice. That was what they were going to do at Norwich within the next few weeks. The setting was almost finished; and the machine was being erected. They hoped to have some interesting figures to place before the gas industry before long. There was one other remark. A Committee of the Institution, of which Committee he happened to be a member, were now inquiring into the methods of carbonization; and many of the members of the Association had received circulars on the subject, and had given the Committee a great deal of information, which was being tabulated and prepared. More information would be obtained by visits to some works; and he thought Mr. Paterson had already given permission to them to go and make further inquiries at Cheltenham. From what the members had heard that afternoon, they could not go to a better place than Cheltenham for such information.

Mr. W. LANGFORD (Longton) said, like Mr. Paterson, he felt a bit antiquated, because for about twenty years he had only had in use manual stoking machinery. Although they had these new ideas put before them as regards the heavy charge and longer duration, he felt convinced that the antiquated system of light charges and of short duration had yet to be beaten. He could corroborate what Mr. Paterson said, inasmuch as he was working five-hour charges; and the average make was 8800 cubic feet per mouthpiece. Over last year the make per ton was 12,200 cubic feet, or a little more. This was with manual machines; and he attributed a good deal of the success to the fact that coal was put in in light charges, and was dropped loosely on to the retort, and so the heat could easily percolate the mass. In this way, they got more from the coal, and more from the retorts, and

so utilized the plant to greater advantage. He did not think that machinery would likely pay in works with a make of less than 150 millions per annum, excepting perhaps the chain and pulley system of handling the scoops. Even with manual machinery, and a make of under 150 million cubic feet per annum, he did not think there was much in it over hand stoking.

The PRESIDENT said he should like to express his personal gratitude to Mr. Stevenson for what he had told them with regard to stoking machinery; and they might congratulate themselves on the excellent discussion that had been produced. He should like to make a remark with regard to the statement of carbonizing in his address. As Mr. Paterson very properly said, it all depended upon what an amount included as to whether the figures were comparable with other figures. The item of labour in his own statement included breaking and sorting coke, and also loading into carts. He did not keep the items separately. If he could eliminate these things, his costs would come out to something like Mr. Bell's. The machinery superseded by the De Brouwer in his own case was of the type referred to by Mr. Paterson. It was an excellent installation of manual machinery; and the charges were very satisfactory. So far as he (the President) was able to see at the present time with the methods they had in use up to now, duration of charge, &c., the yield per ton would remain practically the same as before with the manual machines.

Mr. PATERSON: For the same quality?

The PRESIDENT replied in the affirmative. But he was of opinion if he could fill his retorts he should get a higher yield and a higher illuminating power.

Mr. STEVENSON, in reply, said Mr. Bell had asked him if he had kept an account of the make of gas per ton and the illuminating power of the gas made by the inclines and the horizontals hand worked. When he went to Coventry, he hoped to have had inclined retorts at work alone through the summer, but he had never yet been able to do so. Therefore he had no separate record. He agreed with what Mr. Paterson had said—that he considered the scoop could not be beaten; and he thought he had inferred that in what he said in opening the discussion. There was no doubt the charge was never so well laid as with the scoop. In agreeing with Mr. Paterson that the scoop form of charging was the best, he did not agree with the conclusion that therefore the Fiddes-Aldridge machine must be the worst. He held no brief for the Fiddes-Aldridge machine. He believed, from his point of view, it was the best. With this machine the charge was absolutely as lightly laid in as with the scoop, and as evenly; and that was, in his opinion, the advantage of it. As to examining the retort, that was a simple matter, because at any time, for this purpose, the coke could be pushed out before the coal was put in.

THE BENEVOLENT FUND OF THE INSTITUTION.*

The HON. SECRETARY made an appeal to the members on behalf of the Benevolent Fund of the Institution of Gas Engineers. He said he approached the subject with deep sincerity and not a little misgiving. His sincerity was born of his experience in coming in contact with cases in which the Association had been interested, and his misgiving arose from the fear he possessed that he might not succeed in accomplishing what he most heartily desired, in enlisting the practical and sustained support of the members. Some twelve months ago, he desired to enlist the sympathy of the members on behalf of the benevolent fund; and he sent out 110 or 115 circulars to the members; and the total result was 10s. 6d. That was not from a new subscriber, but from one member who was already subscribing. Although they had in the Association 108 members, from the last published report of the benevolent fund it was seen that only seventeen of their number were subscribers; and yet they had good cause to think about the benevolent fund in connection with their Association. The relatives of two of their late members were at the present moment in receipt of £65 a year from the fund; and if they were depending upon the subscriptions raised in connection with their own Association, they simply could not do it. It was thought some years ago that 10s. 6d. was rather a large sum to expect all members of the Institution to contribute to the benevolent fund, and it was reduced to a minimum of 5s. He thought that it was within the means of nearly every member of the Association to contribute to the benevolent fund to that extent. Now there was one thing he wanted to suggest, and should like to see accomplished—that was, that they should have 100 members of the Association subscribers to the benevolent fund of the Institution; and he was particularly anxious to get that number before the end of his present year of office. They had heard a good deal that day about the old age of some of their friends; and some of the members would be surprised to know that he (Mr. Meiklejohn) was twice as old in the secretaryship as Mr. North, and as old as all the other Secretaries of the Association put together. It was seventeen years since he took over the secretaryship; and excluding the interval when he was passing through the vice-presidency and the chair, he had been working as Secretary for fourteen years. He referred to this, because he desired to be released from office at the close of the present year; and there was nothing that would give him greater pleasure than that he could register during this year all the names of the non-subscribing members as subscribers to the benevolent fund.

Mr. T. BERRIDGE (Leamington) said, as a member of the Finance Committee of the Institution, he knew that last year the income of the benevolent fund fell short by something like £18 of the amount paid out.

The HON. SECRETARY said he had intended to move, when making his remarks, that the Association should, as a small thank-offering to the Institution for the handsome way in which they responded to the appeal on behalf of the widow and children of the late Mr. Parsons, vote a sum of 25 guineas to the fund. This was quite apart from his desire that the members should individually subscribe.

Mr. BERRIDGE seconded the motion.

The PRESIDENT, in commending the motion, said it was certainly a startling thing that they had actually received more from, than they had subscribed to, the benevolent fund. He hoped that what Mr. Meiklejohn had said would appeal to every one of the members.

The motion was unanimously adopted.

This concluded the proceedings; and high tea was served before the members separated.

* We learn since the meeting that, in addition to the twenty-five guineas voted by the Association, Mr. Meiklejohn secured £8 12s. 6d. from fifteen new subscribers which he has forwarded to Mr. Dunn. He has also had several other promises to subscribe. We congratulate him.—ED. J.G.L.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The members of the Association met at the Municipal Technical College, Halifax, last Saturday, under the chairmanship of Mr. H. Butterfield, the Senior Vice-President. An exhibition and demonstration of various forms of fuel calorimeters and of photometrical appliances belonging to the institution, supplemented by some lent for the occasion, formed an interesting variation from the ordinary type of meeting. An easy informality marked the proceedings, and questions and comments flowed easily. In addition, an address was given by Mr. J. W. Fell, of Halifax, on "The Advantages of the Use of Ordnance Maps in Gas-Works Practice." In the same building, just twelve months before, an address on the general subject of "Ordnance Maps and How to Read them" was given before the Association; and this address supplemented it on the strictly gas-works use of them. Illustrating his remarks by blackboard sketches and a range of maps on all the scales, Mr. Fell gave an address to the interest and helpful character of which ready testimony was afterwards borne by many members. Point was given to many of his observations by his being able to exhibit various maps illustrating the ways in which they are utilized for many purposes in the Halifax Gas-Works.

Presentation to Mr. A. Clement Hovey.

As mentioned at the close of the report of the annual meeting of the Tynemouth Gas Company which will be found elsewhere, an interesting feature of the proceedings was the presentation of a testimonial to the late Assistant Engineer (Mr. A. Clement Hovey), who, as already notified in the "JOURNAL," has left the Company's service to take the position of Engineer-in-Chief of the works of L'Union des Gaz in Milan. The testimonial consisted of a beautiful illuminated address and a silver tea and coffee service and salver. The address was as follows:—

TYNEMOUTH GAS COMPANY.

To ARTHUR CLEMENT HOVEY, Esq.

On the occasion of your leaving to take up the important position of Engineer-in-Chief to the Milan gas undertaking, the Directors wish to recognize your long and valued services as Assistant Engineer to the Tynemouth Gas Company. In giving you this illuminated address, together with a silver tea and coffee service and a silver salver, we have pleasure in expressing our appreciation of your high personal character and attainments. Under our Chief Engineer, Mr. William Hardie, you have had the responsible task, first of designing and then preparing the whole of the numerous plans and specifications in connection with the new works and steel gasholder; and their erection has been completed, under your superintendence, to our entire satisfaction. These works, with the necessary distributing plant, have cost over £150,000. Whilst we very much regret the loss of your services to the Company, it is extremely gratifying to us to know that you have been selected to fill this post. In wishing you every success, we venture to express the opinion that your tact, ability, and energy will justify the selection, and that you are destined to take a high place in your profession.

J. B. WILLIAMSON, Chairman.
J. J. CARR, Secretary.

The presentation was made by the Chairman, and accepted by Mr. Hardie on behalf of Mr. Hovey, who was on his way to Milan to take up his new duties.

Southern District Association of Gas Engineers and Managers.—The annual general meeting of this Association will be held at the Hotel Cecil on the 12th inst., when Mr. Norton H. Humphrys, Assoc.M.Inst.CE., F.C.S., of Salisbury, will deliver his Inaugural Address.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Annual Meeting in Manchester.

The Thirty-Eighth Annual Meeting of the Institution was held on Saturday afternoon, at the Grand Hotel, Manchester, when there was a large muster. In the earlier part of the day, about forty of the members met at the gas-meter testing-station of the City Justices in London Road, when Mr. S. Dyson, the Government Inspector of Gas-Meters, explained the working of the department, and answered questions put with reference to the appliances in use. Following this, the party made an inspection of the chief fire station of the Corporation, which adjoins; there Mr. F. Bayliss, the Fire Brigade Superintendent, acted as cicerone.

After lunch at the Grand Hotel, the general meeting was held in the large hall there—Mr. W. PRINCE, of Stoke-on-Trent (the Retiring President), being in the chair.

The HON. SECRETARY (Mr. H. Kendrick, of Stretford) read the minutes of the last meeting; and they were confirmed without discussion. Then he announced that 48 members of the Institution had forwarded letters of apology regretting inability to attend the meeting.

A SAD DUTY.

Before the business was proceeded with,

The PRESIDENT said he had a sad announcement to make—the death of Mr. H. J. Robinson, of Mossley. He thought it a lamentable thing that a man should be cut down at such an early period of his life as Mr. Robinson had been. The least they could do at this meeting was to extend to the bereaved ones their deep sympathy in such a sad calamity; and he moved that a resolution to this effect be conveyed to the family by the Secretary.

The resolution was carried with the company upstanding.

The HON. SECRETARY announced the receipt of letters in response to resolutions of sympathy passed at the last meeting from Mrs. Harrison Veevers and Mrs. J. Marsland, widows of members. He had also communications from Mr. J. Timmins, of Wigan, and Mr. J. Wilkinson, of Halifax, acknowledging the vote of sympathy passed by members with them in their illness. Both gentlemen, added Mr. Kendrick, were now much better.

ANNUAL REPORT AND ACCOUNTS.

The Committee, in their report, expressed their pleasure at being able to congratulate the members on the continued prosperity and usefulness of the Institution. All the meetings but one (the excursion meeting) last year were exceptionally well attended; and the contributions to the "Transactions" gave rise to valuable discussions. In addition to the President's Address, papers were submitted on High *v.* Low Grade Gas," by Mr. E. Allen; on "Purification," by Mr. G. H. Niven; and on "The Estimation of Tar Fog and its Separation from Gases," by Mr. R. H. Clayton and Dr. Skirrow. The discussion on Mr. G. E. Stevenson's paper, "Experiences in Competition for Power," read at the meeting at Salford in November, 1906, was completed at the last annual meeting; and, in addition, full descriptions were given of the Liverpool Gas-Works and the Fiddes-Aldridge stoking machinery, by Mr. E. Allen; of the Woodall-Duckham vertical retorts, by Mr. A. M. Duckham; and of the Tully methane-hydrogen water-gas process, by Mr. C. B. Tully. The Committee said the Institution were deeply indebted to the last two gentlemen, as well as to Messrs. Clayton and Skirrow, for their valuable and interesting contributions. Owing to the poor attendance at the excursion meeting in August, it was proposed to do away with this fixture, and reduce the number of meetings to three. Another proposition was to alter Rule 1, so as to allow of the admission of General Managers of gas undertakings as members of the Institution. With the view of bringing about a closer union between the Institution and the two Junior Gas Associations in the district, of engendering a better understanding of their aspirations, and of rendering them greater assistance than has been possible in the past, the Committee recommended that Rule 2 should be amended to include "the Presidents for the time being of the Manchester and Yorkshire Junior Gas Associations," with the *ex officio* members of the Committee. At the same time, the President and Secretary of the Institution would be made *ex officio* members of the Councils of the two Junior Gas Associations, and have equal power of voting with the other members of the Committees. After a reference to the relinquishment by Mr. H. Kendrick of the position of Hon. Secretary, and the election of Mr. W. Whatmough as his successor, the Committee referred to the outstanding feature of the year—the Gas Exhibition in Manchester—as follows:—

The Gas Exhibition, held in St. James's Hall, Manchester, from Oct. 23 to Nov. 9, inclusive, justified its promotion beyond expectations, and has had a most stimulating effect upon our industry over a very wide area; as, in addition to great numbers of consumers, a very large number of gas-works officials and employees found it advantageous to make repeated visits. The opening ceremony was performed on Oct. 23 by the Lord Mayor of Manchester, assisted by the Mayor of Salford. Mr. Alderman R. Gibson, J.P., occupied the chair, and was supported by many prominent people, including Mr. Alderman F. S. Phillips, J.P., of Salford, the Mayor of Widnes, the President and Council of the Institution of Gas Engineers, officers of many local Institutions, the Advisory Committee, and a large number of our own members. The Chairman and members of the Advisory Committee were most assiduous in their attendance at the many Committee meetings, and at St. James's Hall during the run of the exhibition. The technical lectures were highly successful, and large attendances were the rule. The lecturers were Messrs. Dugald Clerk, R. H Clayton, and J. W. Graham, Professor J. B. Cohen, and Messrs. J. G. Newbigging, T. Duxbury, J. H. Brearley, S. Meunier, and H. Kendrick. A highly successful course of cookery lectures and demonstrations was given by Mrs. Middleton, who also conducted a cookery competition for school children, which, for reasons the Committee had no control over, was not well patronized The Committee are endeavouring to arrange for the issuing of a *souvenir* volume, which will contain, in addition to other matters, a very full report of the technical lectures, and will probably be issued to members and friends at the nominal charge of 2s. 6d. per copy.

The Committee concluded by stating that the membership roll bore evidence of an increased appreciation of the value of the Institution, and numbered 155—an increase of five. Death had claimed one of the founders of the Institution—Mr. Harrison Veevers—two had ceased membership under Rule 14, and one had left the profession. On the other hand, nine new members had been added to the roll. The Committee recorded with pleasure the maintained vitality of the Institution, and the great interest manifested in the quarterly meetings.

On the motion of Mr. S. GLOVER (St. Helens), seconded by Mr. R. WATSON (Doncaster), the report was approved.

The HON. SECRETARY, in submitting the accounts, which showed a balance of £37 14s. 5d. on the general account, said it would be seen that the money received on account of tickets for the exhibition inaugural dinner did not, by a long way, meet the expense. A considerable number of guests were invited by the Committee, who defrayed the cost out of their own pocket; but in spite of this, there was a deficit of £9 8s. 3d., which had to come out of the Exhibition Account. This, he thought, would be a sufficient reply to some strictures which were passed upon the Committee in the earlier part of the proceedings. There was a balance in hand on the Exhibition Account of £32 17s. 6d., which was considered very satisfactory. It had been suggested that they should issue a *souvenir* volume of the exhibition, if they could get a sufficient number of guarantees. The matter had been gone into, and the absolute minimum number of copies to warrant their printing would be 420 or 425. The guaranteeing of such a number would just about clear the cost. Some 300 circulars had been sent out to exhibitors and friends outside; but up to the present he had only received replies from 89, and these 89 had promised to take 188 copies—considerably less than the minimum. It had been left to Mr. Newbigging and himself to decide what should be done; and it seemed to him that, unless in the course of a few days there was a better response, the idea of a souvenir of the exhibition would have to be abandoned.

On the motion of Mr. J. C. BELTON (Chester), seconded by Mr. S. MEUNIER (Stockport), the balance-sheet was approved.

REPORTS OF COMMERCIAL SECTIONS—THE MINES (EIGHT HOURS) BILL.

The reports of the Commercial Sections having been taken as read,

The PRESIDENT said that a great deal of useful work had been accomplished. One of the matters dealt with was the Mines (Eight Hours) Bill, about which they might hear something that afternoon from representatives of the Sections.

Mr. MEUNIER (Lancashire Section) said the reports would give those present a very good idea of the work undertaken during the past year by that Section. There was one thing he would like to impress upon the gathering, and that was the desirability of more members of the Institution joining the Commercial Sections. If they were strengthened, it would be better for them all; and they could more adequately deal with the difficulties that cropped up now and then. They had been accused, in years gone by, of being exclusive; but that was not so now at any rate. Of course, they could not please everybody; but they had done their best for the industry they were interested in developing, and they could do a great more if they had a larger membership. One question dealt with by his Section was that of the Mines (Eight Hours) Bill. It was a matter that was very fully discussed; and from information they had before them, they unanimously came to the conclusion that some steps should be taken to bring before those connected with the gas industry the probable effects such a measure would have upon the industry and upon ordinary coal users. They felt that this was likely to become a permanent tax, which they could not but view with concern. The Section discussed the question as to whether the price of coal by such a Bill would be increased or kept at about the same level by an increased output or increased work. At any rate, there was still the danger; and they as representatives of the gas industry, anxious to keep down the price of gas, could not but view the situation with reservation. It had been decided by the Commercial Section to send out a circular-letter asking members to use their best endeavours to so put the question before their boards of directors or committees that they also would see eye to eye with them as to the possible danger arising from a probable increase in the price of coal, whether by a diminution of the output or not. He asked gas managers to "put their backs into it," so

as to induce those having gas undertakings on their hands to take some steps which would show at any rate their feelings in the matter, and put plainly before the people of the country the danger and losses likely to accrue in the future as the result of such a Bill.

Mr. J. H. BREARLEY (Yorkshire Section) had nothing to add to what had been said on the subject. His Section had discussed the question of appointing a deputation, when asked, to wait upon a gas committee, if the engineer felt he had some difficulty in joining the Commercial Section; and it was almost unanimously decided that such a step was undesirable. In their opinion, it was better to let the gas engineer convince his committee of the advantages to be derived from membership of the Commercial Sections. They could show that the nominal subscription was repaid many times over by the information obtained; and there was hardly a member of the Commercial Section who would not say that he had derived great benefit from it.

The PRESIDENT stated, for the edification of the members, that the Institution of Gas Engineers had had the Mines (Eight Hours) Bill under consideration, and had appointed a deputation to wait upon Mr. Gladstone to express, on behalf of those connected with the gas industry, their disapproval of such a measure passing the House of Commons. If that met the wishes of the Manchester District Institution of Gas Engineers, they might strengthen the hands of their representatives on the Council by an expression of opinion.

Mr. S. GLOVER pointed out that they were not in a position to pledge themselves on the subject; and they could not pledge their committees or companies to strengthen the hands of any section of the Gas Institution which might have decided in their own minds to meet Mr. Gladstone on this subject. If the deputation did go, it would only be with a partial backing; and he did not think they ought to strengthen the hands of the deputation as suggested without very careful consideration. He was certain that the Council of the Institution of Gas Engineers would not get the backing in this matter that they sought. It seemed to him that they could only express their opinions individually as gas engineers. Referring to the remarks of Mr. Brearley, he said he was glad that the Yorkshire Section had withdrawn their offer of services where engineers found some difficulty in joining the Commercial Section. It would not be to the advantage of a gas engineer to have a deputation interfering between him and his directors or committee in such a matter.

Mr. BREARLEY observed that Mr. Glover was wrong in saying that the Yorkshire Section had "withdrawn" the proposal. What they did was to pass a resolution to the effect that it was considered "undesirable."

Mr. GLOVER: I said I was glad that the Committee had decided to withdraw the offer of such services.

Mr. MEUNIER: There was no withdrawal.

The PRESIDENT, reverting to what Mr. Glover had said about the deputation to Mr. Gladstone on the Mines (Eight Hours) Bill, said they did not ask members of the Manchester District Institution of Gas Engineers to pledge either their Committee or Council; but as gas men met together in annual meeting, they could surely in their wisdom say, in their own interests, that they approved of the action of the parent Institution.

Mr. GLOVER argued that they could not vote on this subject without in some measure binding the people they represented.

The PRESIDENT said it was not his desire to press the matter upon members at all.

This ended the discussion on the subject.

A RESIGNATION: THE SENIOR VICE-PRESIDENCY.

The HON. SECRETARY then read a letter received from Mr. J. Wilkinson (Halifax), dated Feb. 26, in which that gentleman said that, though very much better in health, his doctor had given him strong warning as to the danger of a return of the ailment, and advised him to take things as easy as possible for a year or two. Under such circumstances, the members of the Institution would see that, if he went forward to the chair next year, he might fail altogether at the last moment. Therefore he desired to withdraw, and at the same time tendered his heartfelt thanks to the members of the Committee for their kind expression as to his welfare.

The PRESIDENT said they all deeply regretted to hear read such a letter from Mr. Wilkinson; and he thought they might ask the Secretary to express their deep sympathy with Mr. Wilkinson that ill-health compelled him to withdraw from what he (the President) considered was one of the ambitions of Mr. Wilkinson's life—namely, to become President of the Institution. In face of the letter, they could do nothing but proceed to the election of another Vice-President in Mr. Wilkinson's place; and the gentleman elected would become their Senior Vice-President. With regard to that, he ought to say Mr. Kendrick felt it would be impossible for him to take Mr. Wilkinson's place this year, and had communicated with Mr. J. W. Morrison (Sheffield), an able member, who had written saying that, if it was the wish of the Committee, he would with pleasure accept the position as Senior Vice-President.

On the motion of Mr. W. S. HADDOCK (Warrington), seconded by Mr. W. SEVERS (Wilmslow), it was unanimously decided to elect Mr. Morrison Senior Vice-President in place of Mr. Wilkinson.

Mr. MORRISON, who was received with applause, thanked the members for the honour done him, and said that when the time came he hoped he would fill the chair with credit to the Institution and himself.

NOMINATION OF DISTRICT MEMBER TO THE GAS INSTITUTION.

The HON. SECRETARY announced that Mr. W. Whatmough (Heywood), who was to succeed him in the secretaryship, had consented to be nominated as District Member on the Council of the Institution of Gas Engineers for 1908-9.

In moving Mr. Whatmough's election, Mr. T. DUXBURY (Oldham) said he did so with pleasure; his chief reason being that he thought the Secretary of their Institution ought to be on the Council of the Institution of Gas Engineers, as it would be of great benefit to the former.

Mr. BEETON seconded for the same reason.

Mr. GLOVER reminded the meeting that, in previous years, the Senior Vice-President had been their representative on the parent Institution. He would therefore like to know why the custom had not been followed this time.

The HON. SECRETARY explained that this action had been taken because Mr. T. Duxbury, the Senior Vice-President, had already been nominated as an ordinary member of the parent Institution.

Mr. GLOVER remarked that he was not sorry, in view of the information given, that he had put his question.

The resolution was then put and carried.

ALTERATION OF RULES—THE ADMISSION OF GENERAL MANAGERS AS MEMBERS.

The meeting then considered *in camera* the proposed alteration of Rule I. to read: "Resident engineers or managers of gas-works, *or general managers of undertakings making* 500 *millions or more per annum*, or gas engineers solely employed as consulting engineers and not engaged as agents for any trading or manufacturing firms." After considerable discussion, the proposed alteration was carried by a large majority, the added words to the old rule being: "or general managers of undertakings making 500 millions or more per annum."

The last sentence of Rule II. was altered by a unanimous vote to read: "Past-Presidents for the preceding two years, *and the Presidents for the time being of the Manchester and the Yorkshire Junior Gas Associations*, to be *ex-officio* members of the Committee."

The next suggested alteration to the rules gave rise to considerable discussion. It was proposed that Rule VII. be amended as follows: "The annual general meeting shall be held *in Manchester* on the last Saturday in February, and the ordinary general meetings on the last Saturdays in May and November. The Committee to have power to alter, if requisite, the date, time, and place of all meetings." This alteration reduces the meetings to three a year instead of four; the abandonment of the August gathering being recommended on account of its occurring during the holiday season, and the poor attendance of members. There was no real opposition to the abandonment of the one meeting; but several present desired to have the third gathering of the year held in the latter part of October, instead of November—the argument being that most gas managers wanted to be at their posts in November, in case of fog. In reply to a question, the Hon. Secretary said that hitherto the November meeting of the Institution had been the best attended next to the annual meeting. Finally, the proposed alteration as set out on the notice paper was carried.

PRESENTATION TO THE RETIRING SECRETARY.

The PRESIDENT then said they had arrived at what he called "the parting of the ways." After five years' service, Mr. Kendrick was retiring from the secretarial chair; and every member of the Institution would agree with him (the speaker) when he said that during this period Mr. Kendrick had rendered them yeoman service. Personally, he had during the last twelve months had great reason to appreciate the valuable services of Mr. Kendrick, as no doubt other Presidents before him had done. In view of these great services, the Committee felt there was something due from them and the members. He could assure Mr. Kendrick that the response had been most gratifying; and they had decided to present him with a handsome gold watch suitably engraved. There was also a diamond ring for Mrs. Kendrick; and they hoped she would long be spared to help her husband in the more important positions of the Institution. In asking Mr. Kendrick's acceptance of the gifts, the President said he and the members of the Manchester District Institution of Gas Engineers trusted he would have good health and live long to render good service to the Institution as he had done in the past. (Applause.)

Mr. KENDRICK said he was extremely obliged for the very kind manner in which the President had referred to the little services he had been able to render to the Institution as Secretary. He had done this work without any idea of personal gain or reward. But he had to admit that the information he had obtained while acting as their Secretary had been of great benefit to him; it could not be otherwise in an Institution like that. When they elected him as Junior Vice-President, he regarded that as a sufficient recompense for what he had done for the Institution. Now they had made him doubly grateful. He highly appreciated what had been said; and he hoped the same kindly forbearance would be shown his successor. On behalf of his wife and for himself, he heartily thanked them for their handsome gifts.

The inscription on the watch is:—

Presented to H. Kendrick, Esq., by members of the Manchester Institution of Gas Engineers, on his retiring from the position as Secretary after five years' service.

COMPLIMENT TO EXHIBITION MANAGER.

Next followed a handsomely framed illuminated address on vellum to Mr. W. Cawood, Manager of the Gas Exhibition held in St. James's Hall, in recognition of the services rendered by him in connection with that event. The address, signed by the Advisory Committee, paid a high compliment to Mr. Cawood's ability as an Exhibition Manager; and this was supplemented by the remarks made in support of the presentation by Mr. Thomas Newbigging and Mr. T. G. Marsh, of the Society of British Gas Industries.

Mr. THOMAS NEWBIGGING said he believed Mr. Cawood would always look with pleasure upon the address, and recall his association with the Advisory Committee of the Exhibition, to whom he was always generous and helpful. He mentioned that the address had been engrossed by one of the members of the Institution—Mr. Matthew Dunn.

Mr. CAWOOD, in the course of his response, acknowledged the great help he received from the Committee. Such was the interest they took in the work, that the exhibition could not help being a success. The issue by the Institution of 40,000 coupons also proved of great assistance to him in the conducting of the exhibition.

THE NEW PRESIDENT.

The PRESIDENT said his next duty was to introduce Mr. Duxbury as his successor in the chair; and in doing so he expressed the hope that members would give him the same cordial support that had been extended to himself during his term of office.

Mr. T. DUXBURY (Oldham) then took the chair, and was received with applause. He moved that a hearty vote of thanks be accorded to Mr. Prince for his services as President during the year. Mr. Prince had done his work well; and his year of office had certainly not been a light one. For one thing, the exhibition entailed a great deal of work upon him; and he was deserving of their cordial thanks.

Mr. BREARLEY seconded, saying that he had the highest admiration for the way Mr. Prince had conducted the business of the Institution.

The resolution was carried with enthusiasm.

Mr. PRINCE, in reply, again bespoke for his successor in the chair the same consideration that had been extended to him.

The PRESIDENT then proceeded to deliver his

PRESIDENTAL ADDRESS.

Gentlemen,—We all deeply regret that, owing to failing health, our respected friend Mr. Joseph Timmins, of Wigan, is not able to occupy the honourable position of President of the Institution; his medical adviser having ordered him to cancel all engagements outside his own town. Our sympathies are with him, and also with Mr. John Wilkinson, of Halifax, the present Senior Vice-President, who has had a serious illness. We sincerely hope that both gentlemen may be fully restored to health and strength, so as to enable them ere long to occupy this chair.

During the year we have to chronicle the death of one of our oldest and most respected members. I refer to the late Mr. Harrison Veevers, who was one of the founders of the Institution, and to whom we owe much, as he was ever a most zealous worker and supporter of the Institution. We also offer our sympathies to Mr. Whatmough and Mr. Marsland, who have suffered bereavement during the year.

And now permit me to thank you for the very high honour you have conferred upon me by electing me your President. I well remember, just twenty years ago, assisting my brother in making some hundreds of tests for the preparation of his Presidential Address for the Institution. At that time, I little thought that I should ever have that honour conferred upon me. During the twenty years, and also prior thereto, we have had without exception excellent Presidents. Our Institution has flourished and been most successful; and I sincerely hope that during my year of office this success will continue, for never in the history of coal gas has there been such keen competition as there is at the present time. We have had many rivals in the field, who are naturally envious of the proud position we hold—notably, oil-lamps, electricity, Dowson gas, Mond gas, acetylene gas, suction gas, and now petrol air. But owing to the timely invention of the incandescent mantle, I can confidently say that for health, efficiency, and economy, either for indoor or outdoor lighting, the good old ship (coal gas) stands well ahead of every other competitor. The same successful position may also be claimed for the heating, cooking, and motive power of coal gas.

During the year, the Institution, together with the Society of British Gas Industries, the Manchester and Salford Corporations, the Exhibition Manager, and last, but not least, our worthy Treasurer, Mr. Thomas Newbigging, as Chairman, have carried through what proved to be probably the most successful gas exhibition ever held, either in this or any other country—viz., the Manchester Gas Exhibition of 1907. The exhibition has given such a "Lift on the way" to gas lighting and heating in this part of the country, that I confidently appeal to this Institution to run a similar exhibition, either in Bradford, Leeds, or Sheffield, two or three years hence.

Before entering upon my address proper, may I be allowed to congratulate the Manchester and Yorkshire Junior Gas Associations on their splendid conference at the exhibition, and also on the success which has attended their efforts generally; and on behalf of the Senior Institution, who, I am sure, are in entire sympathy with their work, we wish the Junior Associations throughout the country every success. At the same time may I remind them that "Heaven helps those who help themselves." Therefore the junior members must not expect too much assistance from their seniors, but continue to help themselves in the future as they have done in the past. They are quite capable of doing this.

It is not my intention in this address to give a detailed description of the Oldham Corporation gas undertaking, as my Committee wish me to extend a hearty invitation to the members of the Institution to visit their two largest works—Higginshaw and Hollinwood—during my year of office; but as I purpose dealing almost exclusively with the manufacturing branch of our profession, it may not be out of place to furnish a few particulars which will enable you to follow my remarks more clearly. The different works I shall refer to are Central, Higginshaw, and Hollinwood, which have a total producing capacity of 10,000,000 cubic feet of coal gas and 1,000,000 cubic feet of carburetted water gas per diem. The total gas made last year was 1,414,000,000 cubic feet, and that sold 1,244,649,000 cubic feet, in addition to 88,766,000 cubic feet of free gas for public lighting, which includes all Board schools, baths, markets, &c. The increase in gas sold during the two years ended March, 1907, was 171,571,000 cubic feet, or 15 per cent. The maximum delivery in twenty-four hours was 8,634,000 cubic feet, with gasholder storage of only 6,535,000 cubic feet. The average price received per 1000 cubic feet of gas sold last year was 1s. 11·67d., and the profit realized on the same year's working was 3d. per 1000 cubic feet sold. Cookers are fixed free, and no rent is charged. All consumers' meters are kept in repair free of cost, and renewed when necessary by the Corporation; but all new meters have to be installed by the property owners in the first instance. The average illuminating power last year was 18·73 candles, tested with Sugg's 18-candle argand burner. The total number of consumers is 45,000, and there are over 12,000 cookers in use.

The capital value of the works as they stand in our books is £590,133, or 8s. 4d. per 1000 cubic feet of gas made per annum; and the excess of assets over liabilities is £359,288. During the past nine years, over £100,000 has been spent on capital account on the works, and at least another £50,000 must be spent during the next three years. A sum of £381,242 has been handed over in relief of rates, in addition to £151,000 for gratuitous gas; making, together, over £500,000. This appropriation of gas profits is most unjust to the gas consumers, who make the profit; for if there is a loss on the year's working, such loss either comes from the reserve fund, which the gas consumer has provided, or the poor gas consumer must make good the loss by paying an increased price per 1000 cubic feet.

There are a number of mills in Oldham that consume practically no gas, but generate their own electricity. Why, then, should these shareholders receive a reduction of hundreds of pounds in their rates out of the gas profits, when they do not help to make those profits? Why should a shopkeeper who consumes gas help to pay the rates of his next door neighbour, who uses electricity? One of the pet arguments by the large ratepayers is, "That as the money was borrowed on the security of the rates, they, as ratepayers, would have to pay it back to the loan holders if anything happened to cause the gas-works to become of no value." Now where is the risk to the Oldham ratepayer, when, during the last 55 years (since the works were acquired by the Corporation), not one penny has ever been taken from the rates in support of the gas-works? I have known a case where the gas-works made a loss of £3800; and still the corporation voted £1000 in aid of rates out of the "gas profits," and raised the price of gas by 3d. per 1000 cubic feet. Even in Oldham the maximum amount allowed by the Act is taken in relief of rates, even if there is a loss on the year's working of the gas-works. If my Committee had been paid for everything during the year ended March, 1907, they could have supplied gas at an average price of 1s. 7d. per 1000 cubic feet, and still have made a profit. Cheap gas and water are quite as important to the trade of the town, and to the inhabitants generally, as cheap rates, as many of the property owners and shareholders of mills reside out of the district.

Six years ago, at our Higginshaw works we adopted West's compressed air separate charging and drawing machines in a new retort-house containing 19 through settings of eights, with regenerator furnaces, and, later on, West's hot-coke conveyor. Three years ago, at the Hollinwood works, we installed West's compressed air combined charging and drawing machines in a re-modelled retort-house containing 16 through settings of eights, with regenerator furnaces; also West's hot-coke conveyor. Prior to deciding upon the latter system of stoking at the Hollinwood works, tenders were obtained for the following methods: (1) Inclined retorts; (2) horizontal retorts with regenerator settings; and (3) the various types of stoking machinery.

As I had had, previously to my appointment at Oldham, considerable experience, extending over several years, in the working of inclined retorts, I was anxious, in the re-modelling of the retort-house at the Hollinwood works, to make a careful comparison between the initial cost and the cost of the working of

inclined retorts and horizontal retorts with modern stoking machinery. In the consideration of this matter, several members of my Committee, together with myself, made a tour of inspection, the result of which decided us in favour of horizontal retorts and stoking machinery, after taking into consideration the very satisfactory working of the machinery at our Higginshaw works, and the fact that the cost of installing inclined retorts, including the raising of the retort-house roof, in our case exceeded that of horizontal retorts with stoking machinery by about £3000.

The results of the Hollinwood works obtained by the combined stoking machines and hot-coke conveyors have fully justified my Committee in making the change, especially as compared with the direct-fired hand-charged retorts previously in use, which consisted of six through retorts in each setting, each retort carbonizing 21 cwt. of coal per day, or 6 tons 6 cwt. per through setting, with four-hour charges. Each stoker carbonized 63 cwt. of coal per eight-hour shift, with a wheeler and furnace man provided, or 42 cwt. with furnace man only provided, or 28 cwt. when doing his own stoking, wheeling, and firing. The average of the three systems works out at 3s. 7d. per ton of coal carbonized, which figure, I am sure you will agree with me, stands very high by comparison with hand stoking in other towns, and warranted my Committee in looking round for labour-saving machinery. With our compressed air combined machines, one man operates the levers for both the charging and drawing of the retorts. The one machine will draw and charge at an average rate of one retort per minute, including the travelling from one retort to another. The coal carbonized per mouthpiece is 3¾ cwt., with six-hour charges; and the machine puts in on an average 170⅔ charges per eight-hour shift, or 32 tons of coal. To deal with this weight, there is one machine man on one side of the retort-bench and two attendants, who open and close the lids, auger pipes, &c. They are paid 5s. 3d. per shift of eight hours, or a total of 15s. 9d. per shift, or 5·9d. per ton of coal carbonized.

Our experience of the combined machine indicates to us that it is specially applicable to, and can be worked to the most economical advantage in, medium-sized retort-houses containing 16 to 18 settings. Our minimum amount of work in summer is eight settings, when one lid man on each side is dispensed with; so that two men carbonize 16 tons for 10s. 6d., or 7·9d. per ton of coal. To work this retort-house, containing 16 through settings of eights, with six-hour charges, 3¾ cwt. of coal per mouthpiece, and 192 tons of coal per 24 hours, with furnaces on each side of the bench clinkered once each in 24 hours, the following number of men are required.

For Sixteen Through Settings of Eights, 192 Tons of Coal Carbonized.	Rate of Pay per Eight-Hour Shift.	Total Wages per 24 Hours.	Wages per Ton of Coal Carbonized.
	s. d.	s. d.	Pence.
6 Machine men	5 3	31 6	1·97
12 Assistants	5 3	63 0	3·94
			5·91
3 Coal elevator men	4 4	13 0	0·81
4 Hot-coke convevor men	4 4	17 4	1·08
2 Compressor and boiler men	4 4	8 8	0·54
			8·34
6 Furnace men	5 3	31 6	1·97
6 Pipe jumpers	5 3	31 6	1·97
			12·28
Interest and sinking fund on stoking machines, compressor, hot-coke conveyors, and boilers		..	1·80
Fuel, oil, and waste		..	0·80
Wear and tear		..	1·60
Total cost per ton of coal		..	16·48
Cost with hand stoking, labour only		..	43·00

For Eight Through Settings of Eights, 96 Tons of Coal Carbonized.	Rate of Pay Per Eight-Hour Shift.	Total Wages Per 24 Hours.	Wages per Ton of Coal Carbonized.
	s. d.	s. d.	Pence.
6 Machine men	5 3	31 6	3·93
6 Assistants	5 3	31 6	3·93
			7·86
3 Coal and coke men	4 4	13 0	1·62
			9·48
3 Furnace men	5 3	15 9	1·97
3 Pipe jumpers	5 3	15 9	1·97
			13·42
Interest and sinking fund	..	..	2·76
Fuel, oil, and waste	..	..	0 80
Wear and tear	..	..	1·60
Total cost per ton of coal	..	..	18·58
Cost with hand stoking, labour only	..	..	43·00

The combined machines installed in 1905 have not been sufficiently long at work to enable me to give the exact cost of up keep. But the separate machines at the Higginshaw works have now been in constant use for six winters; and I am able to give the wear and tear charges. In the cost of working at the Hollinwood works, the wear and tear figures are assumed to be the same as Higginshaw. During the six winters the stoking machinery and coke-conveying machinery have been in operation at the Higginshaw works, 307,510 tons of coal have been carbonized; and the actual wear and tear charges on the whole of the machinery, including the air compressor, amount to 1·6d. per ton of coal carbonized, including all new parts and entire labour charges.

With the compressed air separate charging and drawing machines, for the same number of mouthpieces and the same weight of coal carbonized, the cost for labour at the Higginshaw works is 7·8d. per ton of coal, as against 5·9d. at Hollinwood with combined machines, as one man is required to operate the charging-machine and another to operate the drawing-machine with the same two lid men as before. But as the separate machines will work up to 30 settings with a smaller proportion of men, the cost is proportionately reduced.

Since adopting stoking machinery and regenerator settings at the Higginshaw works, although using a slightly inferior quality of coal, the make of gas per ton of coal carbonized has increased by 1000 cubic feet.

The make of gas per mouthpiece for the year ending March, 1907, was as follows:—

	Cubic Feet.
Higginshaw.	
Regenerative furnaces, machine stoking, 6-hour charges	8,180
,, ,, ,, ,, 4·48 ,,	10,196
Hollinwood.	
Regenerative furnaces, machine stoking, 6 ,,	7,946
Royton.	
Direct-fired retorts, hand stoking, 4 ,,	5,561
Central Works.	
Direct-fired retorts, hand stoking, 4 ,,	5,206

The average make of gas per man, based on every man employed in the retort-house, was as follows:—

	Cubic Feet.
Higginshaw, summer working with 10 settings	30,000
,, winter working with 19 settings	47,000
,, average for the year, 10 to 19 settings	39,000
Hollinwood, summer working with 8 settings	43,000
,, winter working with 16 settings	51,000
,, average for the year, 8 to 16 settings	46,000
Royton, hand stoking	15,000
Central works, hand stoking	17,334

The difference between the amount of work per man with the machine working at the Higginshaw and the Hollinwood works is explained by the fact that at the latter works the machinery is run to its fullest capacity; whereas at the former works it has not full work.

Comparisons of this kind are often misleading, owing to the difference in the quality of coal, illuminating power of the gas, duration of charges, &c.; but in the foregoing comparisons the conditions are practically the same in each case.

HOT-COKE CONVEYORS.

For the first twelve months after our stoking machinery commenced work at Higginshaw, all the coke was removed by means of tippler trucks holding about 10 cwt. each, running on rails, and pushed out by manual labour. This method was not satisfactory, and was too slow to keep pace with the drawing machines. Although my Committee were fully aware of the probable cost of the maintenance of hot-coke conveyors, they decided to erect them, even if the net saving was small.

Cost of Removing Coke by Means of Tippler Trucks.

	Per Annum.
6 winter months, 24 men, at 5s. = £6 0s. per day × 183 days	£1098
3 summer ,, 18 men, at 5s. = £4 10s. ,, × 91 ,,	409
3 ,, ,, 12 men, at 5s. = £3 0s. ,, × 91 ,,	273
365 ,,	
Total cost with trucks	£1780

No allowance for interest, wear and tear of trucks, &c.

Cost with Hot-Coke Conveyors at the Higginshaw Works.

	Per Annum.
6 winter months, 9 men, at 5s. = £2 5s. per day × 183 days	£412
3 summer ,, 6 men, at 5s. = £1 10s. ,, × 91 ,,	137
3 ,, ,, 3 men, at 5s. = £0 15s. ,, × 91 ,,	69
365 ,,	
Cost with conveyor	£618
Add 6 per cent. interest and sinking fund on £2500	150
Add 12½ per cent. repairs and maintenance on £2000	250
Total cost with conveyor	£1018

Net saving by conveyor, £762 per annum.

These conveyors have been at work since Nov. 3, 1903—namely, five winters—and have removed 150,000 tons of coke. The cost of upkeep has been equivalent to 2d. per ton of coke carried, 1d. per ton of coal carbonized, or 12½ per cent. on the capital outlay. In my estimate prior to erection, I allowed 20 per cent. for wear and tear, owing to the gritty nature of the coke. At Hollinwood, the cost of removing the coke by wheel barrows is greater than at Higginshaw, owing to the coke-vault floor being 4 feet below the yard level; and the conveyor cost is lower, owing to improvements.

Cost of Coke Removing with Barrows at Hollinwood.

	Per Annum.
6 winter months, 30 men at 5s. = £7 10s. per day × 183 days	£1372
3 summer ,, 20 men at 5s. = £5 0s. ,, × 91 ,,	455
3 ,, ,, 15 men at 5s. = £3 15s. ,, × 91 ,,	340
365 ,,	
Total cost with barrows . . .	£2167

No allowance for interest, and wear and tear on barrows and shovels.

Cost with Hot-Coke Conveyor at Hollinwood.

	Per Annum.
6 winter months, 4 men at 5s. = 20s. per day × 183 days . .	£183
6 summer ,, 3 men at 5s. = 15s. ,, × 182 ,, . . .	137
365 ,,	
Cost with conveyor	£320
6 per cent. interest and sinking fund on £2500 . .	150
12½ per cent. repairs and maintenance on £2000 . .	250
Total cost with conveyor . . .	£720

Net saving in favour of conveyor, £1447 per annum.

I have made a number of tests from time to time in order to ascertain the percentage of coke breeze made by the coke-conveyor; and the average of all tests made is as follows:—

	¾-inch Mesh.	½-inch Mesh.
	Per Cent.	Per Cent.
Breeze in coke when drawn from retorts into tippler trucks	10	7¼
Breeze in coke after travelling on conveyor from middle of retort-house, a distance of 150 feet, and dropped into overhead hoppers.	10½	7¼

BRICK VERSUS CLAY RETORTS.

Up to six years since, every retort at Oldham, numbering 1376 mouthpieces, was brick built, and always had been. Six years ago, 304 mouthpieces were erected with fire-clay retorts, the whole of which will this summer have been converted to brick retorts; and I am coming to the opinion that the latter are better than fire-clay. My experience is that after two winters' working with clay retorts they become so badly cracked that the loss of gas, wages, and candle power is very considerable. Out of the 152 clay retorts erected six years ago, 72 were so bad at the end of two winters that they were taken out and replaced by new clay retorts of another make, with very little better results; and at the end of another two winters, these were again so bad that they were replaced by brick retorts, which have now been working for two winters, and are in good condition. The remaining 80 clay retorts were taken out at the end of three years' working and replaced by brick retorts, which, after three winters' work, are in good condition. The first cost of setting brick retorts is no doubt higher than that for clay ones; but they are much easier to repair, and do not necessitate the taking down of the whole setting, as well as mouthpieces and ascension pipes. I am still experimenting further with the two classes of retorts, as we have 256 mouthpieces fitted to clay retorts recently erected at another works.

RETORT-HOUSE GOVERNORS.

I have had only a few months' experience with retort-house governors; but such experience has really been most gratifying, though the two governors fixed control only one-half the house, or 8 settings out of 16. Our vacuum in the exhauster-house is 30-10ths, and on the foul-main in the retort-house 20-10ths. The vacuum on the foul-main at the governor inlet is 8-10ths; and this gives, in our case, a level gauge in the retort. We have reduced the liquor overflow or weir valve on the tar-towers to the bottom; but this is not sufficient, and must be lowered further during the summer, as we have still too much seal. The vacuum on the foul-main when the governor is bye-passed shows a very irregular line, and varies fully 10-10ths, and is most erratic on the ascension pipe; while the vacuum when the governor is in action shows a perfectly straight line. Although we have not as yet observed an increased make of gas per ton of coal carbonized—probably owing to having too much seal, and also to one-half the house being ungoverned—the candle power of the gas is certainly more uniform; and this is our chief reason for fixing governors. As our retiring President, in his address last year, described the working of these governors, it is not necessary for me to further take up your time. Suffice it to say that we are so satisfied with these two governors, that we have placed an order for six more.

SPONTANEOUS COMBUSTION OF COAL.

The spontaneous ignition of coal in our coal-stores has given us some trouble during this winter. At the Hollinwood works there was a stock of about 6000 tons of coal, about 20 feet high; and the heating commenced in the middle of the house. We have a large number of wood ventilating tubes, 8 inches square by 20 feet long, perforated with 1-inch diameter holes. At the Higginshaw works these tubes have given satisfaction for six years, and no fire has occurred, though the coal is broken to the same size as at Hollinwood. This is the first time we have stored broken coal at the Hollinwood works, where the fire occurred. There are at least two causes for the fire—first, the summer was a wet one, and during extensions we had a portion of the roof removed over where the fire first commenced, and, secondly, probably 30 per cent. of the coal stored contained a larger quantity of sulphur and iron pyrites than most gas coals. This pyrites, being damp, no doubt became oxidized by the atmospheric oxygen dissolved; and the coal being stored so high, the pressure probably assisted in the generation of heat, which raised the temperature of the coal to the ignition point. Spontaneous ignition having once commenced, it was supported by the oxygen of the moisture, which, again, was no doubt assisted by the ventilating tubes; for, after spontaneous ignition has once asserted itself, these tubes probably do more harm than good.

It is worse than useless attempting to extinguish the fire by means of water, which practically produces water gas, and would further assist the combustion. We tried a solution of carbon dioxide, with no beneficial results. Although the fire occurred early in December, when our production was at its maximum, we were compelled to stop all coal supplies entirely, and cut round the burning mass, so as to isolate it from the bulk of coal in the house. This was a slow process, as we were only using 150 tons a day, and we had probably 3000 tons to remove. In the course of three weeks we had cut off the burning coal, which had by this time, owing to the atmospheric action, assumed a furnace-like appearance all round, and to a height of 20 feet. We now commenced to remove the burning coal to the boilers and to the furnaces of our direct-fired retorts in another house. This occupied about a week, during which period the crude gas fumes in the coal-stores were suffocating, although we had removed the greater portion of the roof. We had two gangs of men working in relays of 15 minutes each. The fumes, being so heavy, would not rise to the openings in the roof. I again tried the solution of carbon dioxide, without effect; and we were ultimately compelled to play the water-hose on the burning mass for about two minutes every half hour, as the fire at times became so fierce that the men could not work. This simply cooled the outer surface of the coal, driving the fire inward.

This summer I purpose storing as little of the sulphurous coal as possible, and as dry as we can; storing it in wave-like heaps, inserting the tubes as before, and testing every tube weekly for temperature. Should there be a rise in temperature, we shall get down around the particular tube. If any member has any better method to suggest, I shall be pleased to hear from him.

PURIFICATION.

During the past few years, various systems of purifier grids have come into vogue, notably the Jäger grid, Spencer's hurdle grid, Cutler's hurdle grid, the "Standard" grid, &c. For some time we have been using three new systems, as at all our works we are very deficient in purifying area. At the Hollinwood works there are four purifiers, each 20 ft. by 20 ft. by 4 ft., also four 16 ft. by 16 ft. by 3 ft. each, which are only sufficient for about 1½ million cubic feet of gas per day; and our make in winter is 2¾ million cubic feet. At the Higginshaw works there are eight purifiers, each 20 ft. by 20 ft. by 4 ft., capable of dealing with about 2 million cubic feet; and our make in winter is 3¼ million cubic feet per day. At the Central works there are four purifiers, 16 ft. by 16 ft. by 3 ft., each capable of dealing with about 500,000 cubic feet; and our make in winter is 1 million cubic feet per day. Owing to so many important extensions in other gas-works plant during the past six years, our purifier extensions have been allowed to stand over until this year; and we are now erecting four purifiers 25 ft. by 25 ft. by 6 ft. each, and four 35 ft. by 28 ft. by 6 ft. each at Hollinwood and Higginshaw respectively.

Hollinwood Works.—In October, 1905, we commenced to use Jäger grids in one set of 20-feet square purifiers, with the following results:—

Four Winter Months' Working.

—	Ordinary Grids.	Jäger Grids.
Average quantity of gas purified per change . . . . . Cub. Ft.	2,169,000	4,038,000
Increased quantity of gas purified per change . . . . . ,,	..	1,869,000
Increased quantity of gas purified per change . . . . . Per Cent.	..	86
Average rate of flow per hour . . Cub. Ft.	29,000	47,000
Increased ,, ,, ,, . . ,,	..	18,000
,, ,, ,, ,, . . Per Cent.	..	62

Six Complete Years' Working.

Total number of changes in each 3 years	778	749
Average quantity of gas purified per change in each 3 years . . . . Cub. Ft.	1,126,000	1,624,000
Increased quantity of gas purified per change in each 3 years . . . . Per Cent.	..	44
Rate of flow per hour in each 3 years. Cub. Ft.	34,000	50,000
Increased ,, ,, ,, ,, . Per Cent.	..	47
Quantity of oxide in each purifier . Tons	14	26
Increased ,, ,, ,, ,, . Per Cent.	..	85
Average back-pressure given by each purifier .	17/10"	2/10"
Cost of wages per purifier changed	30/–	50/–

But for the adoption of these Jäger grids, new purifiers would certainly have been erected three years ago. Therefore the saving in interest and sinking fund on the cost of purifiers in three years has been £600. The cost of installing the Jäger system was £452.

Higginshaw Works.—At these works a set of four purifiers has been fitted with Cutler's hurdle grids; the other set remaining ordinary grids. As there is one common main inlet and outlet to these purifiers, and no separate station meter, it is impossible to say how much gas passed through each set of purifiers. But owing to the reduced back-pressure given by the hurdle grids, we were able to work the valve of the hurdle purifiers two-thirds open, and one-third open on the ordinary purifiers. So that probably two-thirds of the gas or more passed through the hurdle grids. However, taking the whole of the gas passed through both sets of purifiers, the following results were obtained:—

Four Winter Months' Working.

—	Ordinary Grids Alone.	Ordinary Grids and Hurdle Grids.
Average quantity of gas purified per change . . . . . Cub. Ft.	1,158,000	2,131,000
Increased quantity of gas purified per change . . . . . ,,	..	973,000
Increased quantity of gas purified per change . . . . . Per Cent.	..	84
Average rate of flow per hour . . . Cub. Ft.	106,170	115,000
Increased ,, ,, ,, . . . ,,	..	8,830
,, ,, ,, ,, . . . Per Cent.	..	8¼

For One Complete Year's Working.

Total number of changes	446	309
Average quantity of gas purified per change . . . . . Cub. Ft.	1,520,000	2,370,000
Increased quantity of gas purified per change . . . . . Per Cent.	..	56
Rate of flow per hour . . . . . Cub. Ft.	77,000	84,000
Increased ,, ,, ... Per Cent.	..	9
Quantity of oxide in each purifier . Tons	17	34
Increased quantity of oxide in each purifier . . . . . Per Cent.	..	100
Average back-pressure given by each purifier .	30/10"	20/10"
Cost of wages per purifier changed	23/-	46/-

The total cost of installing the hurdle grids was £100.

Central Works.—These works are used during mill lighting months only—viz., October to March inclusive. Here for two winters we have been introducing the gas midway in the purifiers between the two layers of oxide, on the Blackburn system; and as there is only one set of purifiers and one station meter, we have been in a position to ascertain accurately what this system will do. For four years, the same quality of coal has been used, making the same quantity and quality of gas, the same rate of flow per hour, and similar oxide of iron, with the following results from October to March each year:—

—	1905-6. Ordinary Grids. New Oxide.	1906-7. New System. New Oxide.	1904-5. To Jan. 31, 1905. Ordinary Grids. Oxide 30 Per Cent. S.	1907-8. To Jan. 31, 1908. New System. Oxide 30 Per Cent. S.
Total gas purified during six months, cubic feet . .	101,793,000	99,211,000	97,746,000	68,454,000
Total number of purifier changes	103	16	145	31
Average quantity of gas purified per change, cubic feet	989,000	6,200,000	674,000	2,208,000
Increased quantity of gas purified per change, cubic feet	—	5,211,000	—	1,534,000
Increased quantity of gas purified per change, per cent.	—	527	—	227
Quantity of oxide in each purifier, tons	13	17	13	17
Increased quantity of oxide in each purifier, per cent.	—	30	—	30
Average back-pressure given by each purifier . . .	15/10"	2/10"	15/10"	3/10"
Cost of wages per purifier changed.	18/-	23/-	18/-	23/-

The total cost of installing this system was not more than £10.

At the end of the season 1907, the oxide contained 30 per cent. of sulphur; and in order to obtain results during the whole life of the oxide, it has been continued in use during the present winter, with results as shown in Column 4, and a comparison can be made with Column 3, when similar oxide was in use.

CARBURETTED WATER GAS.

The manufacture of carburetted water gas was installed at the Hollinwood works six years ago. The plant consists of two half-million sets with preparation for a third set, and is complete throughout. The total cost of erection, which was paid for out of the reserve fund, was £17,564. Carburetted water gas has several advantages in a large mill district, where hundreds of mills light up unexpectedly during dull or foggy days. We have often sent out from the works a million cubic feet of gas more than normal on a foggy day; and as we have only gasholder storage for 6½ million feet, with a maximum delivery of 8½ millions, our carburetted water gas has been of great service. But for the adoption of this plant, £40,000 would have been expended on gasholder storage at least six years ago. Therefore £15,000, or almost the entire cost of the carburetted water-gas plant, has been saved in interest and sinking fund. We have, however, staved off this expenditure as long as is considered safe, and tenders are being obtained for a new holder of 3½ million cubic feet capacity.

The average works' cost per 1000 cubic feet of carburetted water gas for the year ended March, 1907, was as follows:—

	Pence.	Pence.
Wages—		
Generating	1·31	
Coke and carriage.	0·57	
Purification.	0·36	
Wear and tear	0·35	
Total for wages	2·59	.. 2·59
Materials—		
3·38 gallons of oil, American, at 3d.. . =	10·14	
43·75 lbs. of coke for generators at 7s. 6d. =	1·75	
24·20 lbs. of coke breeze for boilers at 2s. 6d.=	0·32	
9·20 lbs. of lime for purification at 12s. 8d.=	0·62	
14·50 gallons of water for boilers at 4d. . =	0·06	
Oil, waste, and sundries	0·30	
Repairs and maintenance	0·72	
Carting away spent lime.	0·03	
Total for materials, &c.	13·94	.. 13·94
Total for wages and materials.		16·53
Deduct tar made, 10 per cent. on oil used . .		0·33
		16·20
Plus interest and sinking fund on £17,564 . .		2·32
Total cost of 23·5-candle carburetted water gas (No. 2 "Metropolitan").		18·52

I estimate that the price of coke at these works was increased by over 2s. per ton owing to the manufacture of carburetted water gas. This is equivalent to 4d. per 1000 cubic feet of carburetted water gas made. In the production of 109 million cubic feet of carburetted water gas, the coke account was as follows:—

Coke used in generators	2575 tons.
No coke made from the 109 million feet of carburetted water gas	5000 ,,
Reduced quantity of coke for disposal . .	7575 ,,
Coke breeze used in carburetted water gas-boilers	1177 ,,
	8752 ,,

The total sale of coke at these works, in addition to above, is 17,800 tons.

Calorific value of carburetted water gas. .	630 B.Th.U. Gross.
Do. coal gas	600 ,, ,,

To manufacture 1000 cubic feet of coal gas in our new retorts with stoking machinery, &c., as already described, including benzol enrichment up to 20-candle illuminating power (No. 2 "Metropolitan" burner), the cost is as follows:—

		Pence.	
Coal and cartage		10·417	
Benzol		0·417	
Purification		0·373	
Oil and sundries		0·210	
Wages, carbonizing		1·130	
Repairs and maintenance		2·801	
Gross cost in holder		15·348	per 1000 cubic feet of gas made.
Less residuals:—			
Coke	3·398		
Tar	1·428		
Ammonia.	1·484		
		6·310	
Net cost in holder. . .		9·038	per 1000 cubic feet of gas made.
Plus interest and sinking fund		3·000	
Total cost in holders . . .		12·038	per 1000 cubic feet of gas made.

COKE AND "COALITE."

The coke market has been in a fairly healthy condition during the past year, owing, no doubt, to the advance in the price of coal. But the splendid work of our Commercial Sections has certainly been the means of preventing cutting prices by overlapping each others district. Buyers of coke naturally use every effort to bring down prices; and unless there is some combination among coke producers whereby accurate information is obtained

as to market prices, stocks, &c., we shall always be at the mercy of the buyer. It is to be regretted that there are still a few large gas undertakings that are not represented in the Commercial Sections. This enables the large coke producers to injure the smaller ones by dumping coke into their districts; hence it is a case of the weakest suffering. Surely the large producers can do no harm by joining the Commercial Sections, and so conferring benefits upon the gas industry generally, by discussing matters relative to the commercial side of our profession. I am of opinion that the use of coke and coke nuts should be more encouraged, and not only householders, but mills and workshops canvassed for orders. A gas-works should be run on the same business lines as a private concern; and if gas committees generally would give their engineers and managers a freer hand, a great monetary saving could no doubt be effected. For why should a ton of coke, which contains practically the same number of calories as a ton of coal, only realize (say) 7s. 6d., when householders pay more than double this amount for coal? While the price of coal has advanced by 2s. 6d. per ton, the advance in coke is probably not more than 3s. per ton, or an equivalent of 1s. 6d. per ton of coal carbonized.

I cannot leave the coke question without some reference to the new competitor "Coalite." I have never treated this as a serious competitor, as I firmly believe that any market secured from the coal merchant is eventually one created for coke, if coke producers will be on the alert. Gas authorities must strongly oppose any scheme whereby the Coalite Company attempt to obtain powers for selling their bye-product (gas) to our consumers, as I believe is the intention. In order to compete with these patent fuels, gas authorities should encourage the coke-nut bagging trade. In Oldham, about 3000 tons of coke and nuts in 1-cwt. bags are sold annually by the Corporation. We have a small bucket elevator for bagging purposes; and we charge ½d. per cwt. more than yard price for bagging, and 2s. 6d. per ton for delivery anywhere within the municipal borough. With this machine we can fill a 1-cwt. bag per minute. For some time we have been creating a market for coke nuts; and we are at present erecting more revolving screens in order to supply larger quantities. This is no doubt one means of competing against Coalite or other similar fuels.

AMMONIA PRODUCTS.

Up to recently the whole of our ammoniacal liquor was sold by Twaddel's hydrometer test. A most useful return compiled by the Commercial Sections some time ago showed that there was a very wide difference in the amount received per ton of liquor sold in the various towns, owing to the different methods adopted for ascertaining the percentage of ammonia. This led to our going very fully into the question, with the result that we abolished the hydrometer in favour of the distillation test. In my opinion, it is desirable, for the sake of uniformity, that all managers should adopt the distillation test—being a more accurate guide for ascertaining the value of the liquor sold. The average tests of our liquor up to two years ago was as follows:—

—	No. 1 Works.	No. 2 Works.	No. 3 Works.	No. 4 Works.
Distillation test, ounce strength	12·07	12·20	11·93	11·86
Twaddel test " "	10·84	10·57	10·71	11·23
In favour of distillation	1·23	1·63	1·22	0·63

By reducing the temperature of the ammoniacal liquor in the well, and by extra scrubbing in the tower scrubbers, the following results were obtained for over a year's working:—

—	No. 1 Works.	No. 2 Works.	No. 3 Works.	No. 4 Works.
Distillation test, ounce strength	11·89	13·15	11·29	12·89
Twaddel " " "	11·97	12·52	10·64	12·62
In favour of distillation	..	0·63	0·65	0·27
In favour of Twaddel	0·08	..	..	..

We now sell all liquor by the distillation test; but as our contractor had previously allowed in his tender for the difference between the Twaddel and the distillation tests, there was no loss to the Corporation, neither do we gain anything by disposing of the liquor by the distillation test. But our results now show a greater number of gallons sold per ton of coal carbonized; and other contractors who do not know the qualities of our liquor can now tender on a proper ammonia basis. For several reasons, we do not manufacture sulphate of ammonia. But recently I have devoted considerable time and attention to the question as to whether it will pay my Committee to manufacture sulphate instead of selling the crude liquor; and I submit the following estimate for comparison, so that some member may come forward with a paper showing the actual costs of manufacture per ton of sulphate, including every item of cost. The estimated cost is for manufacturing a ton of sulphate of ammonia with a plant capable of dealing with 120 tons of 10-oz. liquor per day. The estimated cost of the plant, including railway liquor tanks, &c., but no buildings, is £5000.

Estimated Cost of Manufacturing One Ton of Sulphate of Ammonia.

—	@	Per Ton of Salt.
	£ s. d.	£ s. d.
Sulphuric acid, 19 cwt.	2 0 0	1 18 0
Boiler fuel, 1 ton of coke breeze per ton of sulphate and cartage	3 6	3 6
Carting clinker away	..	0 4
Lime, 4 cwt. per ton of sulphate	13 0	2 8
Carting away spent lime	..	0 3
Wages, manufacture only, 1 man per shift, 3 men per day	5 3	1 4
Wages, boiler men, &c., 1 man per shift, 3 men per day	4 6	1 1
Wages, purification and settling tanks, 3 men each 9 hours per day	4 6	1 2
Wages, bagging, &c., 3 men each 9 hours per day	4 6	1 2
Bags, string, and labels	..	4 9
Repairs and maintenance, 6 per cent. on £5000, cost of plant only	..	4 10
Railway carriage and labour on 8000 tons of liquor Oldham and Higginshaw to Hollinwood	0 9	5 0
Carting sulphate from Hollinwood works to railway station	..	1 0
Gas and water	..	0 3
Licence, £3	..	..
Sundries, clerks, and management	..	1 0
Rates, &c.	..	1 0
Carriage of sulphate from Hollinwood to Liverpool.	..	6 8
Dock charges at Liverpool	..	2 0
Commission and brokerage, 3½ per cent. on £12 per per ton of sulphate	..	8 4
Loss of sulphate in transit to Liverpool, ¾ per cent. by weight	..	1 9
		4 6 1
Interest and sinking fund on £5000	..	5 7
		4 11 8
Selling price of sulphate f.o.b. Liverpool	..	12 0 0
Cost of production as above	..	4 11 8
		7 8 4

£7 8s. 4d. ÷ 12 = 12s. 4d. per ton of 10 oz. liquor. We can sell on more advantageous terms than this.

From information obtained, the cost of manufacturing a ton of sulphate in twelve Lancashire towns has been given as:

Highest cost of the twelve towns	£3 12 1 per ton.
Lowest " " "	2 9 6 "
Average " " "	2 19 0 "
Estimated cost for Oldham	4 11 8

Why there should be all this difference, I will not at present attempt to explain.

SUCTION GAS.

The scare created some two or three years ago by the introduction of suction gas for motive power is now beginning to find its level; and I still hold to the opinion I expressed at the annual meeting of this Institution a year ago—that "if we produce a good coal gas at 2s. per 1000 cubic feet, there would be little fear of being knocked out of the market by suction gas."

Since last year I have interviewed several suction-gas users, in order to ascertain its actual cost both per 1000 cubic feet and per 1 brake horse power; but I have so far been unsuccessful, as nobody seems to keep an exact record of every item of cost—in fact, it does not seem to be known what it really does cost. I have therefore endeavoured, by the aid of a suction-gas friend, to arrive at the cost per brake horse power with a fair-sized gas-engine running ten hours per day. This engine is stated by the makers to be 45 B.H.P. with suction gas. Anthracite has been taken at the present price—viz., 34s. per ton (which was formerly only about 20s). I have included the cost for town's water, and the labour required for cleaning out the generator, &c., as often as it is necessary, the labour for periodical inspections of the plant during the day, labour required for extra cleaning of piston, valves, &c., of gas-engine caused by suction gas being dirtier than town's gas, and also the repairs and maintenance of plant, interest, and depreciation on capital outlay. I have made the liberal allowance of 20 cubic feet of coal gas per brake horse power; and I have ample margin when I say that coal gas at 2s. per 1000 cubic feet is cheaper than suction gas.

Estimated Cost of Suction Gas with a Plant in Actual Work for the Past Twelve Months.

	Pence.
Anthracite coal, 1·6 lbs. per B.H.P. at 34s. per ton	0·29 per B.H.P.
Town water used, 6·5 gallons per B.H.P. at 1s. 2d. per 1000 gallons	0·09 "
All labour, as stated above	0·14 "
Repairs and maintenance of plant, &c.	0·14 "
Interest and depreciation on capital outlay	0·14 "
Cubic feet of town gas, at 2s., for starting engine, &c.	0·05 "
	0·85d.
Cost with coal gas at 2s. per 1000 cubic feet—	
Allowing 20 cubic feet per brake horse	0·48
Repairs and maintenance of gas-engine	0·05
Interest and depreciation " "	0·05
	0·58d.

Cost of suction gas 0·85d. per B.H.P. = £310 per annum.
Cost of coal gas 0·58 " = 210 "

In favour of town gas 0·27 " = £100 "

I have made a number of tests of suction gas, and find that the gross calorific value of this gas varies from 150 to 160 B.Th.U.; with an average of 155 B.Th.U., as against 600 B.Th.U. for Oldham quality coal gas, and higher with a mixture of carburetted water gas; so that for power purposes coal gas has four times the calorific value of suction gas. In other words, suction gas, produced on the basis of 6d. per 1000 feet (at which price it is not made by the general user) is equivalent to 2s. per 1000 cubic feet for coal gas. I give the following as an average analysis of suction gas and town gas:—

	Suction Gas. Per Cent.	Town Gas. Per Cent.
Hydrogen	18·50	48·0
Marsh gas	0·25	35·0
Heavy hydrocarbons	0·25	6·0
Carbon monoxide	25·00	7·3
Nitrogen	48·20	2·2
Carbon dioxide	7·00	0·9
Oxygen	0·80	0·6
Sulphuretted hydrogen	Trace	..
Combustible gases	44·00	96·3

The above analysis shows the dangerous composition of suction gas, owing to the large quantity of carbon monoxide present in it. This is evidently recognized by the makers of suction-gas plants, who publish on their instruction card that "all producer gas is of a poisonous nature, and care should be taken not to inhale it." Suction gas has the disadvantage of having practically no smell; so that a workman may easily become injuriously affected without knowing that he is in the presence of gas. Another matter which will require the attention of local authorities is the effluvium given off by the effluent water which is discharged into the drains and public sewers, after washing the gas by passing through the suction-gas scrubbers. The quantity of this effluent is very considerable; and from a 45 B.H.P. gas-engine using suction gas 500,000 gallons, or over 2000 tons per annum, of this effluent water, containing distinct traces of sulphuretted hydrogen, are discharged into the town sewers.

BENZOL ENRICHMENT.

Much has been said from time to time about the enriching value and carrying power of benzol vapour. For several years benzol has been used exclusively for enriching at two of our works—carburetted water gas at a third, and cannel at the fourth. For convenience, I place benzol first, as we have coal breakers, elevators, and stoking machinery, which render the use of cannel somewhat difficult, owing to the irregular mixing of the proper percentage; whereas with benzol introduced at the gasholder inlet, the enrichment is both simple and regular. Benzol is also most convenient should the candle power of the gas, through any mishap, be found too low, as extra benzol can at once be turned on, and the candle power improved quickly. Not so with cannel, especially where stoking machinery or inclined retorts are in use with overhead hoppers. Benzol is also beneficial, to a limited extent, in assisting the prevention of naphthalene deposits, although, in our case, not a preventative. Benzol enrichment is generally given as a gallon of benzol for 20,000 cubic feet of coal gas per candle enriched; but the initial candle power of the coal gas is not usually stated. My experience, as near as I have been able to ascertain in practical working during the winter months for several years, is as follows:—

—	No. 1 Works.	No. 2 Works.
Illuminating power coal gas prior to enrichment, candles	16·65	16·30
,, ,, ,, mixed gas after benzol enrichment candles	18·50	18·06
Increase	1·85	1·76
Benzol used, one gallon in cubic feet	13,800	13,500
Gas enriched by 1 candle, using 1 gallon 90's benzol, cubic feet	25,530	23,760

Respecting the permanency or carrying power of benzol vapour, my experience is that 16 to 17 candle coal gas (No. 1 London argand) enriched by benzol vapour to the extent of not more than 2 candles remains fairly permanent—at any rate, for a distance of 1½ miles from the gas-works. In one direction, 1½ miles from the gas-works, a number of tests were taken on several successive days in the month of December; the average results being as follows:—

—	Illuminating Power at Gas-Works.	Illuminating Power 1½ Miles from Gas-Works.	Loss in Candles.
Gas enriched by benzol vapour	19·28	18·94	0·34
Gas enriched by cannel	18·42	18·15	0·27
Average of tests in another direction 1½ miles from the gas-works with greater flow of gas:			
Gas enriched by benzol vapour	19·28	19·00	0·28
Gas enriched by cannel	18·42	18·38	0·04

In each case, oxide of iron and lime were used in purification.

During this period I also made a number of tests with a portable photometer fixed in the bedroom of a cottage 1½ miles from the gas-works. This experience has caused me to have less confidence in portable photometers in temporary rooms selected in various districts of the town, especially during the first five or six days in use. The lights were left burning during the whole 24 hours for nine days in succession; and the tests were taken several hours after dusk, and while there was a fair flow of gas through the trunk main, from which there was only a few feet in length of service-pipe. During the first five days, the illuminating power at the gas-works averaged 19·75 candles, and only 17·36 candles at a distance of 1½ miles—a difference of 2·39 candles. After the first five days, the averages were 19·28 and 18·93 candles respectively—a difference of 0·35 candle. Clean water put in the meter no doubt accounted for something, as I afterwards obtained the following results with clean water as against gas-saturated water taken from the experimental meter.

—	Saturated Water.	Clean Water.	Loss in Candles.
1st day, benzol enrichment	18·05	17·42	0·63
2nd ,, ,,	18·87	18·29	0·58
3rd ,, ,,	16·40	15·84	0·56
4th ,, ,,	18·49	17·50	0·99
5th ,, ,,	16·50	15·87	0·63
Average	17·66	16·98	0·68

In the tests on the third and fifth days, the candle power was purposely reduced for a short period, in order to note the result. I also made a number of tests by passing coal gas through cotton wool saturated with various oils, and afterwards packed inside a 4-inch diameter cast-iron pipe 2 feet long, with a view to ascertaining the loss of illuminating power with each respective oil prior to using same in the naphthalene washer, with the following results:—

—	Illuminating Power. Inlet of Apparatus.	Illuminating Power. Outlet of Apparatus.	Loss in Candles.	Gain in Candles.
90 per cent. benzol, cold	19·04	21·90	—	2·86
Heavy naphtha	20·43	12·73	7·70	—
Gazine	20·15	28·88	—	8·73
Blast-furnace oil	20·63	18·40	2·23	—
American petroleum oil	20·41	18·84	1·57	—
Paraffin	18·92	17·13	1·79	—
Derby solvene	19·28	18·68	0·60	—
Kerosene	19·50	17·25	2·25	—
C.W.G. tar oils	20·83	20·23	0·60	—
Soft soap solution	20·28	19·53	0·75	—

NAPHTHALENE.

Like most towns where regenerative settings and up-to-date methods of gas manufacture have been adopted, Oldham has not escaped the gas engineer's "Will-o'-the-wisp"—naphthalene. Prior to the erection of modern plant, and when only producing about 10,000 cubic feet of gas per ton of coal (and that of 19-candle power) naphthalene was not entirely an unknown quantity in Oldham; but the malady was of a very mild type. The late Mr. John Chadwick had a system of applying naphtha at the outlets of the district governors in order to remove the trouble; and I sometimes think that if incandescent burners had then been used for street lighting to the same extent as now, the naphthalene trouble would have been greater even in those days. Probably 95 per cent. of the naphthalene stoppages in our street-lamps are in those fitted with incandescent burners, as we have very few stoppages with flat-flame burners. For about three years after commencing regenerative settings, although we did not work high heats, comparatively speaking, our street-lamp troubles got worse each year, and we have had as many as 600 lamps affected in one night within the borough and probably another 200 outside, and often we have had 200 to 300 in one night. Then came trouble with our out-townships—for we supply gas to no less than eight district councils, having a population of something like 80,000 inhabitants, and a large number of spinning mills, &c.

We have tried many of the so-called naphthalene remedies. At one works we use from 20 to 30 per cent. of carburetted water gas, which is not a preventative of naphthalene—in our case, at any rate; at another works, we use benzol vapour enrichment, which helps us a little, but is not a remedy. We tried "Gazine," with no better results. Throughout these trials we were compelled to use naphtha at the district governors as formerly, which gave us temporary relief, but which robs the gas of several candles illuminating power, and leaves a deposit of slimy sludge inside the mains; and when these are small, the sludge accumulates and interferes with the flow of gas. As stated previously, we were not working high heats. From good Yorkshire silkstone screened coal we produce 11,000 cubic feet of gas per ton of about 17-candle power, which we enrich to 18½ candles by means of benzol and carburetted water gas. We erected new condensers, washer-scrubbers, &c. But all the while we were losing ground, and naphthalene made its appearance in a very acute form in the service-pipes, where up to about two years ago we had been comparatively free. We erected two Livesey

washers and commenced to use the Derby "Solvene" process on Dec. 1, 1906, with the following results:—

Number of Services Stopped, or Partially Stopped, with Naphthalene.

Month.	1906-7.	1907-8.	Decrease.
November	647	37	610
December	234	34	200
January	157	10	147

No doubt one reason why the "Solvene" has taken something like twelve months to give us any relief is largely due to the accumulation of naphthalene in our mains on the works, under the crown of the gasholders, and in the street-mains, which has had to be dissolved by the "Solvene." Time will not allow me to enter into the many causes of these naphthalene troubles; but I have come to the conclusion that when certain hydrocarbons are taken from the gas during its manufacture, either by high heats, condensation, scrubbing, or any other cause, hydrocarbons of similar composition must be again added, so as to be exactly as though they had never been removed from the gas in the first instance. The hydrocarbons derived from benzol, "Gazine," carburetted water gas, naphtha, &c., are not of the required composition, and therefore will not act as a naphthalene carrier in the same manner as the hydrocarbons originally in the gas. From my experience, the Derby "Solvene," which acts more as a naphthalene carrier, is the nearest approach to the original hydrocarbons. I have not yet tried the light oils or tar from carburetted water gas, or paraffin, or even soft soap, which I believe is being successfully used; but we are at present experimenting with kerosene, although what will answer in one works will not always do so in another. The maximum quantity of naphthalene we have found in Oldham gas per 100 feet has been 8·45 grains, the minimum 0·61 grain, and the average about 3½ grains.

EXPERIMENTAL WORKS.

I am afraid this branch of our works is somewhat neglected. Eight years ago I came to this conclusion, and erected a small plant—viz., 2·24 lbs., or 1-100th part of a ton. After using this plant for some time, I decided that it was not sufficiently accurate for practical gas-works purposes. For the past six years, I have been using a larger plant, whereby we carbonize 24 cwt. of coal per day. The plant is kept in operation for ten months in the year; two months being taken up by overhauling, &c., just prior to coal-contracting time. The plant comprises—

Four brick-built retorts, each 20½ in. by 16 in. by 8 ft. long, direct-fired.
Ascension-pipes, 6 inches diameter.
Hydraulic main, 20 in. by 18 in.
Condensers, 60 lineal feet of 4-inch diameter pipes.
Waller's exhauster and steam-engine.
Tower scrubber, 4 feet diameter and 12 feet high.
Two purifiers, each 5½ ft. by 5½ ft. by 3½ ft. deep.
Station meter, 400 lights.
Gasholder, 20 feet diameter and 8 feet deep.
The necessary tar and liquor tanks, &c.

We have three regular stokers employed on the plant, each of them working eight-hour shifts, who are paid full stokers wages; and they make up their time with other retort-house work, &c. The gas made, after being tested, is turned into the street-mains. We make about 300 tests each year, using 375 tons of coal as supplied by the collieries in the ordinary way; and when contracting-time comes round, we average all tests and buy on results obtained during the whole year. We test for yield of gas, illuminating power, calorific value, impurities, coke, tar and liquor, ash in coal, and coke, &c.; and I have no hesitation in saying that we obtain fully 500 cubic feet more gas per ton of coal by making use of this plant. This increase, on 130,000 tons of coal used per annum, is equal to 65 million feet of gas. I am now convinced that it is almost as important to have an experimental plant on a gas-works for testing the coal as it is to have a weigh-machine for weighing it.

UNACCOUNTED-FOR GAS.

For some time I have been attempting to satisfy myself why the "Unaccounted-for Gas" in Oldham should amount to 5½ per cent., or 80 million cubic feet per annum; and we have for a complete year kept a record of the temperatures of the gas daily at a consumer's meter 1½ miles from one of our largest works, and find that the temperature at this consumer's meter for the year is as follows: April, 42° Fahr.; May, 47°; June, 52°; July, 53°; August, 56°; September, 54°; October, 48°; November, 47°; December, 44°; January, 43°; February, 40°; March, 44°—an average for the year of 47½° Fahr. The gas manufactured is corrected to 60° Fahr. The average temperature at the consumer's meter is only 47½° Fahr., a difference of 12½° Fahr., which accounts for 37 million cubic feet, or 2½ per cent. of the total unaccounted-for gas. The liquid which we pump from our syphon pots probably accounts for another ½ per cent.; and as we have 1700 street-lamps outside the borough, over which we have little control (hence involving loss of gas in various ways), in addition to 3700 lamps within the borough, I estimate another loss of 1 per cent. in street lighting; making a total of 4 per cent. out of the 5½ per cent. unaccounted for. In addition to these items, there are also various errors in the registration of consumer's meters, &c., all of which tends to show that the actual loss in gas-mains is infinitesimal.

In conclusion, I hope your patience has not been unduly taxed, though I am fully aware that one of the qualifications of a gas engineer is unbounded patience. I have confined my address to matters chiefly relating to manufacture; but there are many important questions outside manufacture which I should have liked to have touched upon had time permitted. Again thanking you for the honour you have conferred upon me.

Mr. MORRISON proposed a vote of thanks to Mr. Duxbury for his address; remarking that it was one they could take home with them and study with interest, as it contained a great amount of information.

Mr. T. B. BALL (Rochdale) seconded the motion, which was carried, and briefly acknowledged by the PRESIDENT.

THE PAPERS.

Mr. T. NEWBIGGING (Manchester) read a paper entitled—

INCANDESCENT GAS LIGHTING: A WORD OF CAUTION.

The incandescent mantle has proved a boon to the gas industry, out-distancing in illuminating value and in economy all other known means of obtaining artificial light. To those who use it, having mastered the slight initial difficulties in its installation, there is no more satisfactory appliance for the efficient lighting of works, warehouses, shops, and dwelling-houses of all kinds. But the majority of gas consumers have not yet adopted it, neither is there an early prospect that its use by gas consumers will become universal.

Much of this backwardness to reap the benefit of its marvellous efficiency and economy is due to rank ignorance. In other cases it is not from any lack of appreciation of the light when it is brought under the immediate notice of those concerned. They view it and wonder and admire; but the inertia of indifference returns, and they are satisfied to go on as before. Or it may be that they hesitate, fearing that the difficulties and expense of its adoption would more than outweigh its advantages. Some of them have made actual trial of its installation, but not having the aptitude or the deft fingers necessary for handling the mantle, they have been baffled at the outset, and so to escape further worry they are content to continue in the old rut. Others, again, do not care for any better light than that to which they have been accustomed; and so they will have none of it, economy notwithstanding—of which, however, they are sceptical.

These facts should not be overlooked by gas managers. There is undoubtedly something to be said in extenuation of the unwisdom of most of those who omit or decline to avail themselves of the advantages offered. Some of them have been imposed on by specious representatives to purchase very second-rate gas-burners and mantles; and as these occasion the users constant annoyance and worse, they become disgusted with the whole thing, and either cast them aside or, continuing to use them, blame the gas for all their troubles. But, whether justifiable or no, the fact remains that the majority of gas consumers have not adopted, and, unfortunately, are not likely, immediately at least, to adopt incandescence.

Meanwhile the fiat has gone forth that gas of low illuminating quality, and the universal application of the incandescent system, is to be the policy of the gas industry in the immediate future. Well and good, provided the latter desideratum is assured, accompanied by efficiency in the appliances.

Some managers of a sanguine and enthusiastic temperament—and these are often the very best men—have grasped at the idea, rejoicing at the vista thus spread out before their mental vision; and without having secured more than the very partial adoption of the mantle in their respective districts, they have begun to carry out the other conditions—viz., that of producing gas of low, or at least reduced, illuminating value. This is a mistake, as they will find, or have already found. Consumers must not be—will not be—coerced into adopting even that which, if adopted, would prove a marked benefit. The universal application of the incandescent mantle will eventually come about; but the growth of preference in that direction will be gradual and even slow, and there will be ebbs as well as flows.

The cry, "Bad Gas," is easily raised; and it is an infectious cry, like the barking of a dog in a doggy neighbourhood—often permeating a whole community without real justification. The gas industry is peculiarly liable to this kind of attack, owing to the wonderful success it has achieved, and continues to maintain in the face of what might be looked upon as adverse conditions. There are always plenty of envious tongues ready and eager to utter, or to encourage, disparaging criticisms. Further, in order to insure the best results from incandescence, an increase of pressure in the gas supply is required beyond what served for the flat flame; and if this is inadequate, the inevitable result is disappointment and annoyance, with the usual resort to the cry of, "Bad Gas."

Now the internal piping and also the fittings of many houses—not only those of ordinary cottages, but oftener, indeed, houses of the better class—are so disgracefully small and pinched throughout, as to render an adequate pressure an impossibility. To convince most consumers of this, is a thankless task; the response

often being: "They served for the lighting previously, why should they not still serve?" And so they decline to go to the expense of providing the remedy. Even with the fittings in perfect order, the incandescent system unquestionably necessitates an increase of the initial pressure in the mains beyond what was formerly sufficient. But this can only be a partial remedy where the internal canalization and fittings are inadequate.

Under such latter conditions, the gas manager has a disheartening task that calls for all his patience and persistence to overcome. With perseverance, however, the difficulties in this respect will eventually be surmounted.

It might be that the wages of lighting and heating inspectors appointed to the special duty of instructing consumers in the application and use of the incandescent system, in the management of cooking stoves and gas-fires for heating, and in other ways, would be a profitable item of expenditure in the long run. In my Presidential Address to the Gas Institute in 1885, I advocated the appointment of "Heating Inspectors" to instruct consumers in the proper use of gas in that direction. The suggestion has since been acted on in some of the larger undertakings, with the addition to the duties of such officials of giving instruction in incandescent lighting. This system of inspection and instruction might well be more widely adopted by gas authorities.

The moral I wish to enforce is: Do not be pressingly anxious, just yet, to bring about the millennium by reducing the illuminating power of your gas by unduly increasing the make per ton, or by using raw material of an inferior kind. The day may come when a non-illuminating gas, along with incandescence, will be the universal vogue. But that day has not yet arrived; and if a premature compulsion is attempted in either direction, the invention which we all recognize as being of the greatest benefit to the gas industry, and from which so much is still expected, and rightly expected, may, in many cases, prove indirectly to be a positive drawback.

As the afternoon was well advanced, discussion on Mr. Newbigging's paper was deferred to the next meeting. For the same reason, the paper on "The Construction and Costs of a Concrete Gasholder Tank," by Mr. E. Frith, of Runcorn, given below, was taken as read.

Compliments.

A vote of thanks was accorded Mr. S. Dyson, of the gas-meter testing station, and Mr. F. Bayliss, Fire Brigade Superintendent, for acting as guides to the members visiting their respective departments earlier in the day.

The retiring officials were cordially thanked for their services during the year.

The vote was acknowledged by Mr. Newbigging, as well as by Mr. Elliott, one of the Auditors, who said the work had been done so well by the Secretary that very little was left for them to do.

This concluded the business part of the proceedings; and subsequently the members partook of "high tea" in the hotel.

THE CONSTRUCTION AND COSTS OF A CONCRETE GASHOLDER TANK.

By E. Frith, of Runcorn.

[A Paper presented to the Manchester District Institution of Gas Engineers last Saturday.]

At the request of the Hon. Secretary, the writer has pleasure in presenting for your consideration details of the construction and costs of a concrete gasholder tank at the works of the Runcorn Gas Company.

The tank is entirely of concrete, 106 feet diameter by 30 feet deep, from the rest stones to the top of the wall. The wall is 2 ft. 3 in. in thickness throughout, with twelve piers 5 feet by 4 feet. The tank is in the solid ground to an average depth of 20 feet, and is supported with an embankment above ground level. The inside of the tank is faced with cement rendering ¾-inch thick. A two-lift Gadd and Mason holder of 497,000 cubic feet capacity has been erected in the tank, which has been filled with water for some weeks, and is watertight.

The construction was spread over a period of three years, and was done during the slack seasons by the regular men on the works. The work ceased for the winter when the men were required for their ordinary duties. The site was an old clay pit adjoining an existing gasholder. The surface of the ground was very uneven, and had a rise of one in seventeen from north to south. The ground was known to be of a very firm character, having about 6 feet of clay on the surface over marl of varying depth up to 10 feet, with shale below to the level of the foundation. Sand was found in large quantities, but only gave trouble on the north-east side, where extra depth had to be provided for the inlet and outlet pipe recess, and on the south side, where large pockets of red moulding sand were found.

The method adopted in excavation was to make an annular cutting of the required radius, 2 ft. 3 in. wide, of an average depth of 20 feet, with the necessary provision for the twelve piers. This cutting, when completed, formed the mould for the concrete; the ground on the inside being removed at a later stage, as will be described. The cutting was made in three sections, each being filled with concrete to the ground level before proceeding to excavate the next. It was only where sand was found that much strutting was required; but in bad weather precautions were taken to prevent the clay at the top becoming loosened and falling in. The whole of the ground on the foundation level was very firm, and it was only necessary to undercut the sides slightly to form footings. In making this annular cutting, it was, of course, of the utmost importance to keep the inner side very true; and where a fall of sand occurred, the hollow thus formed had to be filled up to the correct radius with timbering, loose bricks, or clay, according to the extent of the fall. If, however, the fall of sand was on the outside, this was merely filled with concrete as it was reached.

The concrete employed throughout the work was composed of 3 parts brickbats, 3 parts clinker, 2 parts sand, and 1 part of cement. The sand used was coarse Mersey sand; no suitable sand being obtainable locally, although Runcorn is noted for its red sandstone. Emphasis must be laid on the necessity for having a large stock of good, clean, hard clinker before commencing any large concrete construction, as clinker has special binding properties. Materials for the work had been kept in readiness, and every available opportunity taken for securing suitable aggregate at low cost. The best quality of English Portland cement was used; and its condition was frequently tested to ensure uniformity in the work. A mixing box of the usual type, with sloping sides, was employed; the dimensions being 6 ft. 4 in. square by 16 inches high.

A portion of the dumpling, about 30 feet by 12 feet, was laid with concrete to a thickness of 6 inches, to form a mixing-stage. This afterwards became the top of the dumpling. This mixing-stage served for the whole of the wall to a height of 20 feet, and also for the dumpling; but suitable movable wooden stages were provided for use while constructing the upper portion of the wall (see fig. 4). The concrete materials were turned over twice dry and three times wet; the mixing being done by hand. Before placing the first layer of concrete in the cutting, a thick grouting of cement and sand, composed of two parts of sand to one of cement, was poured over the bottom. The concrete, lowered in buckets, was placed in position while the grouting was still soft; thus ensuring close contact and a firm foundation. The layers were about 1 foot in thickness, laid evenly, and sufficiently rammed; care being taken that the concrete and the earth backing were well united. If any spaces could be perceived when the concrete was dry, they were filled with grouting. This practice was continued throughout the whole of the construction below the ground level.

By this means the wall was made quite solid with the earth backing, and the greatest possible support ensured for the tank wall. Hollow places on the inner face of the cutting were filled with suitable loose material, such as slate, clay, &c., which could be easily removed when the excavation for the tank took place. After any interval, the surface of the concrete was well watered, and grouting was poured over the work before another layer was put on. At the same time any soil that might have fallen from the sides of the cutting was carefully removed. When the ground level was reached, wooden moulds were employed to construct the wall to the required height (see figs. 3 and 4). Each section of the mould was made of two pieces of 4-inch by 3-inch spruce, 12 feet in length, sawn to the radius of the tank. Twenty-four ¾-inch tongued and grooved flooring boards, each 3 feet long, were nailed across these, on the convex or concave side according as they were required for the inside or outside of the tank wall.

The sections were kept in place by means of 1-inch bolts screwed at both ends and provided with large washers and nuts. These bolts, resting on the top of the concrete, passed through the boards and across the wall, thus supporting the moulds, and when screwed up tightly held them very rigidly. Distance-pieces were fixed across the top of the moulds at intervals of 4 feet. When fixed, the moulds extended about two-thirds of the circumference, and were carefully levelled and plumbed. The concrete was then filled in as before; the long bolts across the wall being built in, and withdrawn when the concrete was sufficiently set to allow of the removal of the moulds. The moulds for the piers were in three pieces, bolted together at the corners and also to the circular moulds. These were of similar construction to the circular ones. The moulds were moved round the wall as required, and were lifted as each layer was completed until the right height was reached. (See figs. 3 and 4.)

When the ground level was reached, it was thought advisable to strengthen the wall with bands of iron. To supply these, advantage was taken of a disused gasholder, the main bars of which required very little alteration to make them suitable for the purpose. Half main bars and purlins were also used. At a height of 17 feet—*i.e.*, just above ground level on the north-east side of the tank where the ground was lowest—a strong contractor's rail, about 30 lbs. per foot, was placed in the wall round the recess for the inlet and outlet pipe. The first complete band was of 3 in. by ½ in. flat iron, and was placed at a height of 20 ft. 4 in. from the bottom of the wall. The second and third bands were of 4 in. by 4 in. by ⅜ in. T iron; the former being placed 6 inches above the base plates of the holding-down bolts, and the latter 2 ft. 6 in. higher. The fourth band was of 3 in. by ⅜ in. flat

iron, 2 ft. 6 in. from the top of the wall. Pieces of iron of varying lengths and thicknesses were placed diagonally in the wall about 6 feet apart throughout the whole of the circumference. These served to form a bond with the bands, and so gave the wall greater tensile strength. All ironwork was carefully coated with cement when in position.

When the wall was completed to the ground level, rails were laid entirely round the tank, and a steam travelling crane was used to lift and carry the soil and tip it where required (see fig. 3). The excavation of the interior of the tank was then proceeded with at intervals; sufficient earth being taken out to supply the requisite backing for the wall as the height increased. The level of the rails was altered as the wall was raised, and as the crane was travelling on the made ground of the embankment, it made this very solid without any manual labour being required, excepting to keep the rails at the proper level. Sections of the mould used for the wall were employed in making the slopes of the dumpling and in laying in the bottom. Boards which had been used for the inside of the wall were placed at a suitable angle at the base of the dumpling. These moulded the concrete to form a skew-back for the slope of the dumpling, which was afterwards built up by means of the boards that had been used on the outside of the wall.

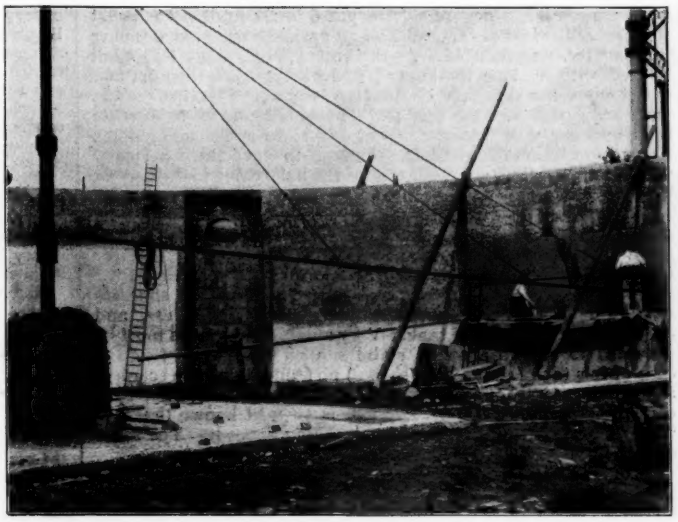


Fig. 1.

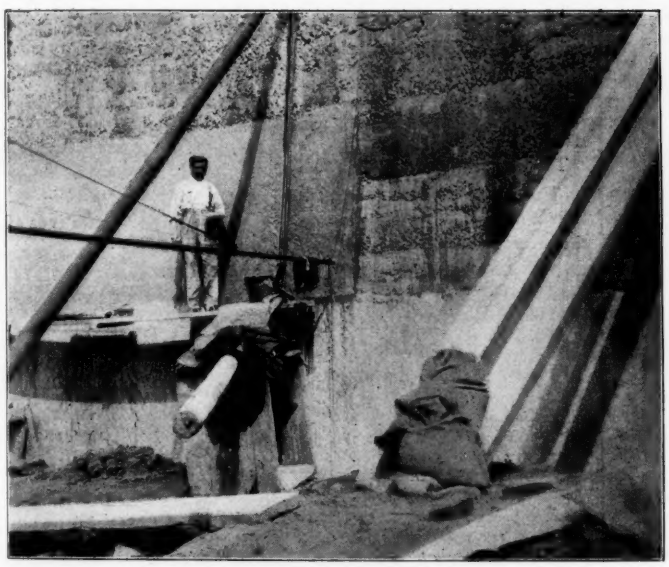


Fig. 2.

When the excavation of a portion of the interior was completed, the rendering of the inside of the wall was commenced. Any soil adhering to the surface of the concrete was brushed off, and inequalities were removed. The surface, having been made quite clean, was well watered and the first coat of cement roughly applied. When this was sufficiently set, the final coat was carefully trowelled on and smoothed down. (Fig. 2 shows the two stages of the plastering of the wall.) The open nature of the concrete made it an excellent key for the cement rendering, the total thickness of which was $\frac{3}{4}$-inch. When the rendering was being applied to any portion of the tank, laths were laid against the concrete to divide the rendering into sections. These laths were removed when the trowelling ceased. The laths materially facilitated the work of the plastering by serving to keep the thickness of the cement uniform. The spaces left on their removal allowed room for any expansion in the cement when setting, and were afterwards filled up. The holes left in the wall after taking out the bolts which were used to support the moulds were first partly filled with cement and then plugged with cores made of pure cement. To avoid the risk of leakage, care was taken when plastering to round off the angles at the base of the wall, &c.

The top of the dumpling was left unplastered until the ironwork was completed, so that no damage should be done to the cement rendering by tools, &c., falling during the erection of the holder. The rest stones

Fig. 3.

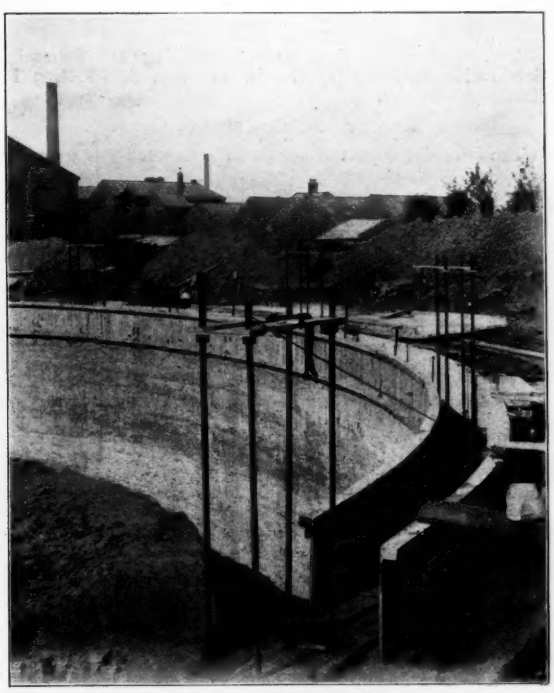


Fig. 4.

were made of fine concrete (strength 6 to 1); and in each rest stone, near the foot of the wall, half an earthenware pipe, 6 inches in diameter, was inserted. As the bottom of the tank had been formed with a slope to the wall and with a fall to the inlet and outlet pipe, the drainage of the tank while the ironwork was proceeding was an easy matter. The holding-down bolts were built into the wall firmly, and not left loose as is usually done. Great care, therefore, had to be taken to have them perfectly vertical and equidistant. To ensure the bolts being in the correct position, cast-iron base-plates, 2 inches thick, cast in open sand, were used at the bottom of the bolts. Wooden templates were also employed at the top (see fig. 4).

The ground in which the tank was built was very suitable for the construction of an ordinary brick and puddle tank, yet the writer's father (the designer) preferred to construct it in concrete with cement facing, because of the solidarity, tightness, and cheapness of this form of tank. Very ample foundations must be provided to ensure absolute stability with puddle; but in the case of this tank (as has been shown) no foundations and scarcely any footings were necessary. The impervious character of cement rendering, properly applied, is so well known that it is unnecessary for the writer to say anything about it. The same cannot be said for brick and puddle.

There are many reasons why a concrete tank should be cheaper than one made in other materials. First, absence of skilled labour. Only four skilled workmen, three bricklayers, and one crane driver were employed at one time on this tank, and these only for a few weeks. Secondly, cheapness of materials; concrete aggregate being decidedly cheaper than bricks, especially when the materials have been stored for some time in readiness. Thirdly, absence of all scaffolding. Fourthly, no unnecessary excavation—*e.g.*, in the tank just described no ground had to be got out for work to be done and then replaced.

The cheapness of this tank will be apparent from the following figures:—

Tank, including materials and labour	£1675
Two-lift Gadd and Mason holder, capacity 497,000 cubic feet	3820
Inlet and outlet pipe, valve, &c.	121
Total	£5616
Cost of the tank per 1000 cubic feet of gasholder capacity	£3 7 4
Cost of the holder per 1000 cubic feet of gasholder capacity	7 18 7
Total cost of tank and holder per 1000 cubic feet of gasholder capacity	£11 5 11
Cost of tank per 1000 cubic feet of tank capacity	£6 2 8

SOCIETY OF BRITISH GAS INDUSTRIES.

The Annual General Meeting of the Society was held last Wednesday, at the Holborn Restaurant. There was an excellent attendance of members. At the opening of the proceedings, Mr. DUGALD CLERK, the retiring President, presided.

The SECRETARY (Mr. Arthur L. Griffith) read the minutes of the last meeting; and they were confirmed.

NEW SECTIONS.

A resolution was then passed, ratifying the formation of Section X. for Fire-Clay Goods, and also Sub-Section II. for Exhauster Makers.

REPORT OF THE CENTRAL COUNCIL.

The following report of the Central Council was unanimously adopted:—

In presenting the second annual report to the members of the Society, your Council are confident that good work has been done during the past year, and that the benefit of such a Society has become generally acknowledged. By the co-operation of all the members, much more may be done in the future in this way; and it is hoped that extended use will be made of the Society by all the sections.

The usefulness of the Society has been proved to many of its members who under the auspices of some of its sections have been able to enter into official arrangements with gas companies, to approach bodies such as the Standards Department of the Board of Trade and the Railway Clearing-House, and to deposit mutual agreements for safe custody, &c.

Although the meeting between the Institution of Gas Engineers and the Society with regard to standard clauses in contracts did not result in any definite arrangement being come to, yet it is hoped that the Institution will not be unwilling to reconsider the question in the near future.

The Councils of the Royal Institute of British Architects, the Society of Architects, and the Architectural Association are being approached with a view to arranging a conference between the architects and the engineering and contracting sides of the gas industry on gas and its appliances for lighting, heating, and ventilation. The Institution of Gas Engineers have already expressed their willingness to deal with this at a proper stage; and when the consent of the architects is obtained, the different sections of our Society interested will be asked to go fully into the matter, so that it may be dealt with to the satisfaction of all concerned.

The Manchester Gas Exhibition held in the autumn of last year under the auspices of the Manchester District Institution of Gas Engineers and this Society was pronounced on all sides to be a great success; and the harmonious working of the Joint Advisory Committee contributed largely towards this end. Your President and Council and Secretary attended the opening ceremony by the Lord Mayor of Manchester and the inaugural banquet, at which a large number of gas engineers and contractors were present. The exhibition itself was an object-lesson in the advantages to be derived from co-operation between the two sides of the gas industry.

The second annual dinner of the Society at the Holborn Restaurant in November was a notable event of the year, when many prominent guests were present, including gas engineers, architects, and others, several of whom dwelt on the advantages to be gained for the gas industry by co-operation between gas engineers, gas contractors, and architects.

The warm thanks of the Society are due to Mr. Dugald Clerk for the admirable manner in which he has filled the position of first President, for his continual efforts on its behalf, and for his able addresses delivered before the Society, entitled "Some Improvements in British Patent Law" and "Science and Practice."

The Society is highly honoured by the acceptance of the presidency by Sir George Livesey; and your Council look forward with confidence to continued success and increased usefulness under his guidance. No greater compliment can be paid to the Society than the acceptance of the position by Sir George Livesey.

The membership of the Society is steadily increasing, 19 new firms joined during the past year—making a total membership at the end of the year of 55 firms. It is hoped that there will be a good increase during the present year; and towards this end the Council will be glad if the members will bring the aims and objects of the Society before their friends.

The sections have now been increased to ten—an extra one having been formed for the manufacturers of fire-clay goods, at the request of some of the makers; and the result has been that several firms have joined that section. A sub-section has also been made for exhauster makers, and one or two prominent firms have become members.

Your Council trust that the members will think the financial position of the Society is satisfactory, and that the work has been done economically.

The financial statement was also agreed to.

ELECTION OF OFFICE-BEARERS AND CENTRAL COUNCIL.

The following elections of office-bearers and representatives of the sections on the Central Council were duly made:—

President—Sir GEORGE LIVESEY.

Central Council.

Chairman—CHARLES CLARE.

J. ARMITAGE DRAKE	representing	SECTION	I.
THOS. S. CLAPHAM	,,	,,	II.
FRED J. WEST	,,	,,	III.
J. W. BROADHEAD	,,	,,	IV.
JOHN MACKAY	,,	,,	V.
JAMES W. WILSON	,,	,,	VI.
THOS. G. MARSH	,,	,,	VII.
JOHN E. WILLIAMS	,,	,,	VIII.
H. N. BICKERTON	,,	,,	IX.
	,,	,,	X.

Honorary Secretary—CHARLES CLARE } *Ex-Officio*
Honorary Treasurer—H. M. THORNTON } *Members.*

Secretary—ARTHUR L. GRIFFITH, 46, Queen Victoria Street, E.C.

Mr. CHARLES CLARE moved a vote of thanks to the retiring President (Mr. Dugald Clerk), and also proposed that he be elected the first Honorary Member of the Society. In the course of his remarks, he said that about the time of the formation of the Society, some of them thought that the gas industry resembled an incomplete wheel. The hub, represented by the Institution of Gas Engineers and kindred institutions, was there, and there were the spokes, consisting of the manufacturers and contractors. But there was no rim; and the Society was formed to rectify this omission and to be the rim. It was necessary that its aims and objects should not clash with those of the Institution, because, as Mr. J. W. Helps truly said at their autumn meeting in 1906, "this organization had to work on the same platform as, though in perhaps somewhat different ways to, the Institution of Gas Engineers." Further, it was necessary that the first President should be a man not only acceptable to the members, but one who would also possess the goodwill of the gas engineers. The members chose Mr. Dugald Clerk; and he (Mr. Clare) was sure they all agreed that the choice was a wise one. Mr. Clerk looked thoroughly into the constitution of the Society; and, on taking his seat as President, stated, at that same meeting in 1906, that the objects of the Society were perfectly legitimate, and that there were many useful things that could be performed by an organized body such as theirs that could not be performed by individuals alone. Although at that time there was doubt and mistrust about the Society, Mr. Clerk did not hesitate in accepting the presidency; and the members owed him a debt of gratitude for having then assumed the position of head nurse to the infant Society, and for having fed it with the light and wholesome sustenance contained in his admirable addresses on "Some Possible Improvements in British Patent Law" and "Science and Practice." The members hoped his year of office had been as pleasant and satisfactory to him as it had been to them, and that he foresaw more useful ways open to the Society than he did even at the first. They did not intend to lose touch with Mr. Clerk, and would like to show him a special mark of their appreciation of his services. The members had only one way in which they could do this, and

that was by conferring on him the honorary membership of the Society. This class of honorary members was designed for those who had rendered good services to the Society, and for those whom the members wished to honour. They therefore requested Mr. Clerk to be their first honorary member. He (Mr. Clare) asked the members to show their appreciation of their first President's services by passing to him a hearty vote of thanks and confirming his election as honorary member.

Model Clauses for Contracts.

Mr. F. J. West, in seconding the motion, remarked that it was a fortunate choice they made when they selected Mr. Dugald Clerk as their President. He had devoted himself heart and soul to the work of the Society, and especially in connection with its formation. Indeed, Mr. Clerk's services had always been at the disposal of the members. He had offered them advice which they had been pleased to accept; and he had led them in one or two matters of importance to the members. He (Mr. West) should like to specify one; and that was the meeting between the Council of the Institution and the Council of the Society regarding the subject of standard clauses in contracts. On that occasion they were led by Mr. Dugald Clerk in an able manner, and in a manner that was very acceptable and agreeable to the whole of the engineers present. Although the Society did not get what they wanted, he trusted the time was coming when they might hope to meet with better success. He understood that Mr. Dugald Clerk had offered to accompany them when this matter again came forward. Mr. Clerk was also successful in introducing another section to the Society—the Gas-Engine Section. Their retiring President had certainly won their warmest thanks.

The motion was heartily endorsed.

Mr. Dugald Clerk, in his response, observed that he felt at once glad and sorry that he was only to be the President of the Society for a few minutes longer. He was sorry to part with the members; but he could assure them that, during the little more than a year that had passed, it had been a time of great pleasure, and indeed he had considered it an honour to be associated with the actual manufacturers and builders of many different apparatus and plants that were required in the making up of the greatness of Great Britain. Without the actual work, no amount of science or political economy, or anything else, was of any avail. They were the workers of Great Britain; and as one of the workers who had had some connection both with the actual practical work and the scientific side of it, he had felt it a great honour to be connected with the Society. The Society, he felt, would in the future fulfil even more important functions than in the past. He had had much pleasure in working with Mr. Clare and Mr. Griffith; and it was also a great pleasure to him to have had a discussion with the Committee on the proposed standard clauses for contracts. He took great interest in the Committee; and he was sorry they did not succeed in carrying their point before the Institution of Gas Engineers. But he thought their work was not lost on that occasion, because he felt certain their cause was a just one, and the position they took up was a just and true position for honourable men, as they knew their friends of the Institution of Gas Engineers to be. He could not help thinking that after a little more pressure, the Council of the Institution would begin to see the position the Society were working for was a true and good one. He (Mr. Clerk) had had some conversation with several members both of the Institution and of their own Society; and he thought the time was ripe to press the matter a little further. He had therefore told their Secretary that he should be glad to accompany any deputation to the Institution to again discuss the matter. He would, however, make one suggestion, and that was that the nature of the standard clauses should be well threshed out by a good representative number of the members of the Society, and that they should have the clauses cut and dried, and ready for discussion by the Institution, before approaching them again. If he could help the members in any way, he should be most glad. He could not say how pleased he was to be associated with the Society as an honorary member. In resigning the presidency, it was a source of gladness that he was passing it into the hands of a man whose honour and capacity were so completely recognized as were those of Sir George Livesey. He indeed felt it an additional honour that he was to be followed by a man who had had such a conspicuous career in the gas industry. He would now say "good-bye" to the presidential chair, and ask Sir George to take it.

Sir George Livesey, on taking the chair, was received with enthusiasm. He remarked that he esteemed it a great honour to have been asked to accept the presidency, because he felt that a Society of this kind was calculated to do an immense amount of good, and that the members must be actuated by a spirit of fairness and goodwill towards all with whom they had transactions, or they would not belong to a Society like this. He hoped that the address he was about to read would be followed by a discussion full, frank, and free.

PRESIDENTIAL ADDRESS.

Sir George Livesey on Buyers and Sellers.

It was a happy thought that led to the formation of this Society; but it may be asked, Why am I here? You have paid me the high compliment of inviting me to be your President for this year; and I confess that it is a pleasure to accept the position. But this is not a sufficient answer to the question. I am here for several reasons. I approve of your action in forming the Society, because I believe it is right, and that it is not only to the advantage of the gas industry, but that such an Association may have a beneficial effect on industrial relations generally.

There is a common idea that buyers and sellers are necessarily antagonistic—each trying to get the better of the other. But this cannot be their true relation. Whatever may have been the case in primitve times, before the introduction of money as the means of exchange, buying and selling is an extremely important element in daily life the world over. We—that is, so-called civilized mankind—are all either buyers or sellers; and most of us are constantly acting in both capacities. Therefore it might well be supposed that after many generations of practical experience both as buyers and sellers, we should long ago have discovered, and acted upon, the true principle on which business should be conducted. But with all our boasted civilization, there still remains room for great improvement. It is not for any body of men engaged in a particular business to set up as reformers of anything but that which concerns themselves; but it is certainly their duty to do all that in them lies to make and to keep their plot in right good order, and thus, while benefiting themselves, set a good example of righteous dealing to their neighbours and the world at large.

In the first place, it is necessary that a Society such as ours should be the means of creating a feeling of confidence that its members can be trusted to deal fairly. There can be no satisfactory business relations where mutual confidence between the parties does not exist; and this Society can be, and must be, a potent agent in creating it. Men generally know what is right, even though their practice may not be in accord with their knowledge; and it seems to me that this Society must be a material supporter of all right-doing.

It has often been said that a body of men will do or sanction acts that they as individuals would not approve or do; but this is only true when there is no sense of individual responsibility. I would say of such a Society as ours that the direct opposite is the case. Any discreditable action by any of its members brings discredit on the whole body. Every member, therefore, must feel the responsibility of maintaining a high standard of conduct in business. I once read that the tone or sense of honour of the House of Commons was higher than that of any of its members, because it is compounded, so to speak, of the best of them all. And so with our Society, which must make for honourable, righteous dealing. And if so, what more natural and proper than that the business relations of buyers and sellers in our industry should be both happy and satisfactory? Mutual confidence between them is the starting point, based, as it must be, on the assurance that each will deal honestly and considerately with the other. It is a great pleasure and satisfaction to know that there was no necessity for the Prevention of Corruption Act for the gas industry, because that important factor of honest dealing had been taken up by the industry itself, and was rapidly disappearing. This Society is a potent "prevention of corruption act," which is part of its mission, and therefore entitles it to a warm welcome. It is a great pleasure to bear testimony to the fact that in my long experience the honest man has not been a *rara avis*, and that the majority of men dealt with could be trusted. A little incident occurred when I was a boy under my father. The duty on glass was repealed; and the contractor who repaired our public lamps immediately (and before his contract expired) came to my father and reduced the contract price by the amount of the duty. That was the late Thomas Sugg, meter maker, uncle to our lamented friend William Sugg. The act greatly pleased my father; and Thomas Sugg had the contract constantly renewed until his business life ceased. On the other hand, the evil practice of demanding and giving commissions was prevalent—5 per cent. on contracts and on goods and 3d. a ton on coal; or envelopes containing bank-notes put into the hands of managers were not unknown. This Society, however, is a guarantee that those evil days shall not return; and with this remark the subject may be dismissed.

One of the evils of present-day trading is the fierce competition that is prevalent. In some trades, and under some circumstances, it is productive of much hardship and injustice; so much, in fact, that there are those who call for the abolition of competition. Others try to circumvent it by the combination of the members of a trade in what is known as a ring or a union. Neither plan will do. To abolish competition is impossible; and if it were possible, it would stop all progress and take the life out of business. Unions, or rings, or combines—call them what you please—would do the same if they could be made permanent. But, lacking a good foundation, it is their fate sooner or later to break up. No; competition, a prominent element in human nature, we must have. And our task is to so conduct it that its hardships are minimized and its advantages secured. The remark may here be made that this Society cannot become a combine because its membership is open to all the various industries dealing with gas undertakings. It is, in fact, rather an obstacle to the formation of a ring by any one of the industries.

Gas boards and committees and their managers expect to be put upon the best terms in making their purchases—they being the best customers. For instance, they object to be charged a higher price than that at which articles are sold to the trade, which is the practice in certain cases. This creates an ill-feeling, and is sometimes circumvented by buying through a dealer. The

relations of buyer and seller cannot be perfectly satisfactory under such circumstances.

In one way the Society can combine properly and advantageously without detriment or injury to anyone. Of all industries, the gas industry seems most given to exhibitions; and great hardship has thereby sometimes been inflicted on manufacturers of gas appliances. Before the Society was established—it was the outcome of one of these exhibitions, and one of its best results—certain individuals promoted an exhibition; traders were invited to show their goods at great cost for rent, fitting up, attendance, &c., which they hesitated to incur. One yielded, and the rest had to follow. Now, however, the Society have changed their position from weakness to strength; they are not helpless. The matter is considered on its merits, and a deliberate decision made, probably in conjunction with representatives of the gas industry; and if in the affirmative, arrangements can be made for a fair division of the expenses.

With most men business is a necessity; it is their lifework. With all businesses there are anxieties and difficulties; but they are the common lot, and our duty is to meet them bravely, and do our best to overcome them. A man, however, should find pleasure in his work; and the important question is, In what way it is to be found? If he fails in this quest, his business becomes drudgery; and the best part of the benefit he might derive from it is missed. There can be no pleasure or satisfaction worth the name to be found in a business where the benefit it confers is not mutual. The desire to obtain an advantage is as old as Solomon's time, who said: "It is naught, it is naught, saith the buyer, and when he has gone his way then he boasteth." So in all the ages since have buyers and sellers more or less acted, although a greater than Solomon gave, in an incomparable sentence, a universal rule to govern all the relations of man with his fellows—a rule which, if obeyed, would make heaven on earth. Men may say this is not business; but "live and let live" (a proverb often used by business men) is, in common language, a form of the golden rule, as is also the saying, "Do as you would be done by." And although many deny by their practice its applicability to the business of buying and selling, and even say it is not practicable, none dare to say it is not right. It is a sad and humiliating thought that with a simple, clear, and infallible law as our guide (which if obeyed would be a sure and certain remedy for so many ills), we should be so slow to practice it. Is the reason to be found in the idea that business is something apart from life—that it is only to provide the means of living—whereas to most of us business is our life, the developer of character, our sphere of influence, and which, while supporting ourselves, also enables us to do our part equally with all other classes and professions for the good of the community or the nation. The alternative to the golden rule, "Thou shalt love thy neighbour as thyself," is forcibly expressed in St. Paul's following words: "But if ye bite and devour one another, take heed that ye be not consumed one of another." How true, alas! of much present-day business. The great and chief object of this Society, if it would do its highest and best work, is to make business respected and honoured by encouraging its members to conduct it on the everlasting principles of justice and truth towards all men—including, of course, the employees.

The mention of employees opens another vastly important and very interesting question, to which the same great principle completely applies. To dilate on this subject would greatly lengthen my address; but it cannot be passed over entirely. The relations of employers and employed are extremely unsatisfactory, and are a burning question of the day. Here again mutual confidence is wanted as the initiatory step towards the remedy; and, to create it, employers must make the start. A better division of property is necessary. Both parties are to blame for the present unsatisfactory conditions, and both must work together for their improvement. The two wings of the industrial army, instead of being at variance with each other, must, if the best is to be done for both and for the nation, become united. But how to unite them is the question. It will not be by Unions or federations of employers on the one hand, or employed on the other, which are simply fighting organizations. Neither will it be by conciliation boards or courts of arbitration, which only deal with differences or disputes after they arise, and at the best are only palliatives. They do not unite the parties in a common interest. They do not lift the workers to a higher stage or permanently improve their position by making them, or helping them to become, owners of property, and thus giving them a tangible stake in the country. Hence the growth of socialistic notions among workmen, and the demand for Socialist measures such as the Eight Hours Bill, which are regarded by the Socialists with satisfaction as steps in the direction of their ideal—the nationalization of all the means of production, distribution, and exchange—though they never explain how it can be brought about, or how it will work. Impossible thought it be, much mischief is being wrought by the movement in that direction; and, of all men, employers can do most to stem the torrent. Mazzini, writing of the labourer, said, "You were a slave, then a serf, now a hireling, and [prophetically] you must ultimately become a partner." This prophecy has been fulfilled in certain cases in various trades; but there are great difficulties in the way of its application generally—but surely not so great as those which have been overcome in the transition from slave to serf and from serf to hireling. The difficulties, great as they are, will have to be overcome, however, if capital and labour are ever to be united. This is the most important problem the industrial world has to deal with; and co-partnership is the solution. A start was made not many years ago by two able and earnest men whose business was with gas companies; but both were cut off in the prime of life, and, unfortunately, their successors in the management of their respective businesses found difficulties in continuing their co-partnership systems, and gave them up—one reason being that the workpeople did not respond in the right spirit. In fact, many needed patiently and sympathetically educating; and, with the leaders gone, it was not done.

If employers could be convinced that it is a great work, well worth the doing, and bringing a most abundant reward, their desire to help and benefit their workmen, which is much more general than is commonly supposed, would find a worthy scope in co-partnership for their energies and goodwill, and they would thereby render a great service to the nation.

To return to the great principle that applies to all the relations of man with his fellow-man in all ages and under all circumstances and conditions—that great and sublime principle or the rule of life that Christ gave to the world nineteen centuries ago: "Therefore all things whatsoever ye would that men should do to you, do ye even so to them, for this is the law and the prophets."

Discussion.

Mr. Archibald Main said they must all be conscious of a similar thought—that it was an extremely significant thing that such an address, breathing such a spirit, should be given to a body of business men in the heart of the City of London. He had no doubt their President remembered a very curious old article by Mr. Henry Rogers on "The Eclipse of Faith, and the Blank Bible." It was curious because of the circumstance that it supposed that people woke up one morning to discover that every Bible was a blank, that every quotation and reference to the sacred volume was quite obliterated; and the interest in the scene occurred in the attempt to supply the omissions. Rogers said that it was very singular indeed to note that people remembered best the texts that they had most habitually violated. He (Mr. Main) hoped no gentleman would suppose, when he expressed admiration of the address of their President, that he was doing so in any spirit in which he would desire to pose as a person who at all times and in every place had acted up to the ideal to which they had listened. He admired the ideal; he wished he had always lived up to it; and he hoped that in the future he might do so. But this did not lessen his admiration for the address. After all, it was by ideals that they lived; and their President was a forerunner in putting ideals before them. He had opened up the important principle of profit-sharing; and in his address he had touched upon a subject which the members must all feel to be one of the greatest problems confronting them. That was the unrest among the great masses of the people, and the very prevalent opinion that the evils from which the country was suffering could be remedied by Socialism. It was a great mistake, he was sure, to belittle the spirit that was among a large section of the people; it was a great mistake not to pay attention to it. They must not forget that the great bulk of these people were perfectly sincere; and they believed this one method was the way to the promised land. If any member had not read a reply by Robert Blatchford, in the "Fortnightly Review," to a very able writer in the January number on the subject of Socialism, he should advise him to do so. Much as they would disagree with Robert Blatchford's writing, they would be forced to admit that he had the capacity for handling the English language, and that such writing could not fail to appeal to the great masses of the people. Votes were not weighed, they were only counted; and the polling-booth was the only place in the world where the wise man and the fool were on an equality. The representation of the masses of the people was growing increasingly powerful; and whether they liked it or not, the great Labour problem was before them. He was sure he was expressing the feeling of admiration of all present that their President should have had the courage and the wisdom to give them such an address.

Mr. T. Clapham, in seconding the motion, said the President had asked for criticism; and they knew he liked to be found fault with, if it could be justly done. He (Mr. Clapham) was not in a position to criticize. The address, however, so much agreed with his own sentiments that he could only at once express his personal thanks for it. He believed he was considered to be a business man, but rather old-fashioned perhaps, because he always felt that he cared nothing for business unless he made friends of those with whom he dealt. In his opinion, there should be mutual trust and confidence between them. The views expressed in the address were those that had permeated the Council in connection with the Society of British Gas Industries from the very first. They felt that these were the principles which must guide them. Though the members were but human, they desired to have an ideal; and it was only by ideals they could get anywhere near the standard they desired to work up to.

Mr. T. G. Marsh said, on the question of employer and employed, his views were much on a par with those of the President; but, as manufacturers, they naturally found there were many difficulties to be contended with. At one time, he thought a bonus scheme would be a good thing; but he had found that it was not. If a man was to put his heart into his work, it was necessary that that man's gain should rise and fall proportionately with that of the employer; and therefore he was entirely at one with the Unions who objected to bonuses. But they also objected to profit-sharing; and he was not at all certain that the socialistic

ideas that were abroad would not eventually end in rending and severing the Trade Unions. He was strongly sympathetic with many of the socialistic leaders; at the same time, he knew their ideals were practically impossible. But in the past the ideals of the idealist had frequently found shape in something practical. He believed co-partnership was one of these practical results. Socialists had pointed out that workmen ought to participate in some of the comforts and gifts of life, and be given an opportunity to prepare for the day when they possibly would be unable to work. Sir George had shown them that, in his own particular province, profit-sharing was practicable. But in the case of contractors, it was a more difficult matter. In businesses that were of a repetition character the case was perhaps different. Where contracts were not varying from day to day, or in works where the turn-out was practically always the same (say, in a weaving-shed, in a spinning mill, in a meter-making shop, or in a gas-stove works), he thought there should not be much difficulty in arranging a profit-sharing scheme—that was to say, where there was regular employment. Sir George had another advantage—practically speaking, all the consumers of gas were also profit-sharers.

The PRESIDENT: They are partners anyway.

Mr. MARSH (continuing) said this was one of the difficulties in the case of the contractors. If it were possible that the employers, the labourers, and the users could participate in all business, the co-partnership scheme was one which would lead to much peace and much cheapening of production. But there were great difficulties confronting them. Perhaps the President could throw out some hints on the subject that would assist the members.

Mr. J. W. BROADHEAD also thanked the President. The address, he said, was worthy of Sir George; and he (Mr. Broadhead) did not think he ever listened to one he enjoyed more. He was much in sympathy with the co-partnership system; but manufacturers like the members of the Society found great difficulty from the very fact that their workmen were already members of Trade Unions. So long as Trade Unions existed, so long would it be impossible for the ordinary manufacturer to adopt the system. With regard to the Society, the members had benefited from it in several ways. One way was by the control it had exercised upon exhibitions. There would also be benefit by the adoption of standard clauses in contracts, which he was glad to hear had in some measure their President's sympathy.

Mr. FRED. J. WEST pointed out that Sir George would have seen that one of the objects of the Society was the promotion of just and honourable practices in business. He (Mr. West) quite agreed with the view of Sir George that competition was a good thing. Competition was a good thing so long as it was fair. But ungenerous competition was what they suffered from in these days; and that was what they all objected to. If through the Society they could promote fair and generous competition, they would have achieved one of their objects. There was no doubt about it, the gas industry had reached its present efficiency and position through competition. Speaking of the business in which he was personally interested, he had not the slightest hesitation in saying that competition had been one of the best possible things to bring out that which was best in those concerned, and to bring out something better than that which they brought forward in the past. As to co-partnership, he foresaw a certain amount of difficulty in introducing a scheme on the lines Sir George indicated. In the case of the Company with which he (the speaker) was identified, they had adopted what they called a bonus scheme, which was answering very satisfactorily. Therein he differed from Mr. Marsh. The scheme they had applied took the form of a bonus on the standard wage—the recognized wage in the district—for extra effort a man might put forward. This paid the firm and the men handsomely; and it was generally accepted in their district that the men were more ready to work in their establishment than in others.

The PRESIDENT: Is it the same as the premium system?

Mr. WEST replied that it was not the premium system, but it was something very similar to it. As to taking up this question of co-partnership as a body, he might say that he was on the Executive of the Employers' Federation in Manchester. He was afraid the scheme of co-partnership if suggested to them at the present time would receive the cold shoulder, owing to the attitude of the men. It was wonderful the amount of suspicion with which men received schemes put before them on the lines of even a bonus or co-partnership system. Before the engineering strike, the masters were not in a position in which they could introduce even a bonus scheme. The men forbade it, and would have struck if such a thing had been introduced. How, too, was co-partnership affected by municipalization? In these days many classes of business were being municipalized.

The PRESIDENT: There was a discussion by the Labour Co-Partnership Association as to its applicability to municipal employment; and they could not see a way of applying it at all.

Mr. WEST said he was going to ask whether co-partnership could be applied to municipal employment. He was a representative on a Corporation; and he certainly could not see any means by which the men could be brought into co-partnership.

The PRESIDENT: Neither can I.

Mr. DUGALD CLERK said he had listened with much interest to Sir George Livesey's able and illuminating address. In a small compass, he had touched upon a great variety of subjects of vital importance to the country at large, and to themselves as manufacturers. They were all, the President said, either buyers or sellers. The whole of the operative part of the country must be naturally buyer and seller and manufacturer and user. They could not have any other arrangement at all in any working country. The problem which any country had to face, and which any business had to face, was to offer sufficient inducement to mankind to enable those who were lazy to find it necessary to do some work. If they were all of the ideal type, and all earnestly desirous of working hard and saving, there would be little difficulty even in a socialistic scheme. But it must be remembered that there were many members of every community who did not intend to do honest work, and did not intend to do work of any kind if they could help it. In all civilized communities, there must be some spur of interest to make men work. Though his sympathies were with the working man, and he would gladly see a profit-sharing scheme such as the one Sir George had proposed in operation, there were, in many works, difficulties arising from the workman himself, who often looked upon such schemes with the greatest suspicion, and thought the masters had some unworthy motive behind them. He honoured Sir George for having overcome all prejudice in the case of the Companies in which he had successfully introduced this scheme of co-partnership, to the great material advantage of the men.

The PRESIDENT said he had quite hoped there would be some criticism or some talk about these high ideals not being practicable. He appreciated what Mr. Main had said. It was all very well and right to have a high ideal. If they had that ideal before them as their object in life, it was the best they could do. Regarding investment and the acquisition of property, in the olden time men could not invest money. They had to hoard it up. The giving of opportunity for investment was largely the work of the nineteenth century. The joint-stock system was one by which people had been able to acquire property, and to safely invest their savings. It had given the middle classes an opportunity for investment; it had enabled people to live; and it had distributed property as it had been created. The other step that had to be taken was to induce the bulk of the people themselves to participate in these opportunities. He looked to the twentieth century to do for the working class what the nineteenth century had done for the middle class. With reference to the introduction of bonus, profit-sharing, or co-partnership systems into certain manufacturing businesses, he could well understand the difficulties. The gentlemen to whom he referred in the address were the late Mr. Henry Willey and the late Mr. Richmond. Both were enthusiasts; both started a profit-sharing system something allied to the South Metropolitan Gas Company's. But they found the difficulty Mr. Dugald Clerk had referred to; the great difficulty being in the men themselves. Both those employers failed in inducing the men to save their property. They had experienced the difficulties in the South Metropolitan Company. Proceeding, he said there were not the same difficulties in introducing the system in gas companies that there were in connection with some trades. He appreciated the difficulties that appertained to ordinary trades. One difficulty was the irregularity of employment; and there was the difficulty, too, of Trade Unions, and the suspicion of the men; but there was no doubt, if they did get the men interested, they earned whatever bonus within reason they might be paid. While there were difficulties in regard to ordinary trades and ordinary manufactures, he was not going to admit that they were insuperable. Things could not go on as they were; they had got to be settled. Although the scheme was started in 1889 at the South Metropolitan Gas Company's works, it was a long time before any other gas companies would move; and now there were only a few—the South Suburban, the Commercial, Chester, Newport (Mon.), Leamington, and the Walker and Wallsend. The system was a success; and it had been proved that the bonus was earned by the men. If directors of gas companies only understood the enormous difference the system made to all engaged in the work, he could not conceive there would be indifference. Unfortunately, however, directors largely did not understand anything about the work. But the members of the Society were engaged in it directly. He agreed with Mr. Marsh that bonuses were of no permanent use, or even simple profit-sharing. He did not believe anything was worth troubling about unless it could be made the means of improving the status and position of the worker—unless it made him a property owner. With an annually distributed bonus, the men were no doubt pleased; but instead of making for thrift, it acted in a reverse way. Co-partnership was doing a permanent good, and this was why the Socialists did not like it, as it was cutting the ground from under their feet. Not the least of the benefits of the better distribution of property through co-partnership was the great improvement in the men themselves. As to Trade Unions, he noticed what Mr. Broadhead said. There was no doubt they divided the industrial nation into two opposing camps; and while this was the case, he saw very great difficulty in gaining the confidence of the workmen, but that was the first thing necessary in doing anything for the men. He was glad to hear what several speakers had said, that the Society meant to do what was honest, fair, and right between its members and their customers, the gas companies. Among his concluding remarks, the President said that the intercourse he had had during a long life with traders, manufacturers, and contractors had been one of his pleasantest experiences. But the most pleasant thing in his business life was unquestionably

co-partnership. There was one matter in which the Society might assist. It was with regard to the Miners' Eight-Hour Bill. He had just attended a meeting summoned by the Shipping Federation; and he did not think there was ever a meeting so representative of all interests as was gathered together at that meeting. It was convened to see what measures could be taken to prevent this iniquitous Bill passing; and the line taken was that pressure should be brought to bear on the Government and Members of Parliament. The shipping interests were going to circularize their shareholders, to get them to bring influence to bear on their Members of Parliament. He (Sir George) thought the members of the Society might do something in their individual spheres to help to prevent the passing of the Bill; but whatever was done must be done promptly. He thanked the members for their kind reception. He hoped that no one would suppose the high ideal was fulfilled by any of them; but he thought it right they should bear it in mind, and try to act up to it.

On the motion of Mr. DUGALD CLERK, seconded by Mr. CHARLES CLARE, the President was warmly thanked for his address.

The members afterwards dined together; the President occupying the chair. A very pleasant evening was spent.

GAS AND ELECTRICITY AS ILLUMINANTS.

Discussion Between Junior Gas Engineers and Electrical Students.

Last Tuesday evening a debate on "Gas *v.* Electricity for Illuminating Purposes" took place at the Manchester School of Technology, between members of the Manchester and District Junior Gas Association and the Manchester Students' Section of the Institution of Electrical Engineers. The chair was occupied by Professor HAROLD B. DIXON, M.A., F.R.S. It was arranged that all calculations and comparisons were to be based on gas at 2s. 6d. per 1000 cubic feet and electricity at 3d. per B.Th.U.; the British candle being the unit of light. Both sides were well represented; the members of the gas division predominating.

The rules of debate to be followed having been duly set forth by Mr. FRANKLIN THORP, the discussion was proceeded with. It proved of a very animated character, and lasted for two hours and a half. Most of the speakers had armed themselves with voluminous notes and figures; but in nearly every case the respective chief champions of the opposing parties were not able, in the time allotted to them, to read their notes. When either side was believed to have scored a point, there was loud clapping of hands and vociferous cheering. There was a deafening roar when, at a few minutes to ten o'clock, the attendants of the school, anxious to put a close to the meeting, suddenly turned off the electric light. From that moment to the somewhat abrupt termination of the proceedings, and even while Professor Dixon was delivering his observations on the debate, the electric light was shut off and turned on repeatedly. It is impossible, in the space at our disposal, to give anything like a full report of the proceedings. All that can be done is to indicate some of the points in each speaker's remarks.

Mr. D. L. SANDS opened the debate on the side of electricity. Taking a house of £40 a year rental for illustration, he gave estimates of the cost of lighting it by gas and by electricity, and of the extent of the illumination given by each; but he could not, he said, furnish every detail. He had given credit to both systems where it was due. The electric lamp was now being developed. There had been a great deal of discussion on this question in the trade journals of late. He concluded by reading an extract from the "JOURNAL" for the 11th ult., on the subject of the electric light at West Ham.

Mr. FRANKLIN THORP was the second speaker; and he advocated the great advantages of coal gas as a lighting medium, which he contended was cheaper, safer, and more generally convenient than electricity. He was not surprised that the challenge of a certain gas mantle manufacturing firm had not been accepted by the "general electric light" producers to a demonstration of the capabilities of their respective illuminants and their cost. The "Electrician," which had, no doubt, spoken under inspiration, had given an excuse for the non-acceptance of the challenge; and gas engineers were quite content with the explanation. The observation that incandescent gas light was too dear would not be taken seriously by anybody. He gave figures of the illumination and cost of certain lamps, single and in multiple, and showed that gas lighting was decidedly more economical than electric lighting. Mr. Thorp made fun of the directions to be observed by the users of the electric light, which he termed "commandments," and of the dreadful consequences which might ensue if users failed to observe the least important of them. Shops which had discarded gas for electricity had, he said, gone back to gas. There were 2000 of them at Tunbridge Wells. The inverted incandescent gas-burner was a better light-giver than the vertical one; and gas was more reliable than the electric light.

Mr. J. P. ROBERTS, speaking on behalf of electricity, produced a mass of figures as to the cost of this medium for lighting, and compared them favourably with the statistics given on the other side. Some returns from Birmingham were, he said, a very good set-off to the figures from West Ham. Lamps were used for the purposes of illumination—not to be stared at. From a hygienic point of view, he contended that electricity was preferable to gas illumination. This was a strong point. Poisonous fumes were given off by gas-mantles. There was no getting out of it; it was a fact. The electrician, however, did not go breathing into the air all sorts of poisonous gases. He (Mr. Roberts) charged the other side with bringing forward exaggerated figures, whereas those submitted by the electricians were true. In cleanliness, gas lighting was much inferior to electricity. With gas, rooms in dwelling-houses had to be re-decorated every year; with electric lighting, once in three years was quite often enough. When more light was required in a place, they always had to use electricity. What about the Institute in which they were then holding the meeting? It had adopted the electric light.

Mr. ALSOP pointed out that there had been a rapid advance both in gas lighting and heating. Business men wanted economy with efficiency; and all-sufficient light could be obtained by incandescent gas. He gave statistics, supplied by the managers of cotton-mills, showing a marvellously reduced expenditure by the use of gas compared with the cost of electricity; being in one case £110 13s. per annum in favour of gas. He said many of the new mills in Oldham were not adopting the electric light, as they preferred gas. Householders who had accepted electricity became dissatisfied, and went back to gas. Heat was an essential in a cotton-mill, as spinners could not perform their duties with cold hands; and they got heat as well as light from gas. In this respect alone, gas was economical. In the matter of street lighting, Queen Victoria Street cost £540 per annum with gas and £825 with electricity. The returns of the lighting of Billingsgate, Fleet Street, and the Victoria Station in London, the borough of Islington, and Bradford, Belfast, Cheltenham, Croydon, and other towns, were all in favour of gas illumination. Gas had been preferred to electricity in lighthouses; Captain Salmon having declared incandescent gas to be the best illuminant.

Mr. R. H. CARR criticized some of the figures given in favour of gas, and said the cost of street lighting per mile was absolutely nothing unless they knew the relative distances of the lamps from each other. With regard to mill lighting, there were the dirty ceilings to be considered, and the injury to the health of the employees from poisonous gas fumes. As to street lighting, common sense was on the side of electricity. Great expense was incurred by the replacing of broken mantles, to say nothing of the inconvenience of loss of lighting in the meantime. In private houses, there was double the work with gas, as compared with electricity. Then gas in shops was deleterious and injurious to goods. Dangers arose from taps being left on after some disarrangement or sudden failure of the meter, leading to explosions, and in bedrooms to suffocation. From the point of view of cleanliness, electricity was extremely desirable.

Mr. HOLLINGWORTH remarked that the impurities arising from gas consumption, to which reference had been made, were of small moment. No carbon monoxide or acetylene was produced. [A VOICE: CO_2.] CO_2 was not poison. Gas had been selected in preference to electricity for the lighting of the Birmingham Art Gallery, on the advice of Professor Frankland. The same objection that was urged against gas as an illuminant could be urged against a coal-fire. The air in an ordinary room was more vitiated by electricity than by gas, by which heat was generated and currents were set up. The foul particles were carried to the top of the room, and the bad air driven up was replaced by fresh air drawn in from the outside. The exhalations from the lungs and body of an individual were more injurious than the carbonic acid thrown off by a gas-flame. The Board of Trade did not consider carbonic acid dangerous. All sulphuretted hydrogen was removed from gas in the process of manufacture. In its combustion, all impurities were whisked into space and became innocuous. In the matter of sulphurous emanations, electricity when compared with gas was the greater sinner. The heat from a gas-flame was a valuable asset. For all purposes, whether for cleanliness or for health, the right thing to use was gas.

At this point the speakers were limited to five minutes each.

Mr. C. E. TEASDALE laid stress upon the point that one of the main factors in favour of gas was its reliability; and as this had not been touched upon, he quoted several instances of the failure of the electric light, with the attendant inconvenience and danger. How many towns, he asked, had been plunged into darkness through failure of the gas supply? The instances were so rare that even the opponents of gas could not give them; and those that had occurred had been mostly in some small struggling village, classed as a town, where the gas-works were not properly equipped and managed. The point was, which was the light to be relied upon? He would answer his question by asking another: Why did the owners of every building, large or small, using electric light, deem it advisable to provide gas-fittings? Did this not show its unreliability, and their preparedness to fall back upon their old and faithful servant gas? Let them turn for a moment to the distributing system, and see what happened when (say) two mains—one for gas and the other for electricity—broke. Put shortly, the position was this: In the case of gas, the main could be patched up temporarily, and could be bye-passed during repair. Consequently, the supply could be kept up; and there would be only a nominal loss of gas. With electricity, however, the main must be repaired at once and the supply cut off, with the consequent inconvenience to probably thousands,

and great loss to business men. Again, what happened if an accident occurred at the generating station? The very slightest mishap—such as a spanner dropped across two terminals—was enough to put a whole town in darkness, and sometimes set the station ablaze. If an accident were to occur in a gas-works to stop the make of gas, there would still be in the holders a stock equal to 24 hours' consumption to work upon. What storage had the electricity people? None. What was their factor of safety? The good running of their machines; and they all knew that where so many intricate parts existed, the difficulties of smooth running were increased. Let them look at the seriousness of a continual supply. It was a protection to life and property, provided continuity of business, was a regulator of a town's morals, and was conducive to social pleasure. All this could be claimed for gas; but the same could not be said of the electric light. They could only talk of the inconvenience caused by its failure. The speaker went on to refer to the parlous condition in which users of the electric light found themselves. He said they knew they were consuming current, but there was usually no positive measurement to show how much had been used. Generally speaking, electricity meters were strangers to the truth. He then quoted from a report of the London County Council, to show that during 1905 2396 new meters were tested. Of these, 1226 (or 51 per cent.) were accurate at the first test; 410 (or 17 per cent.) were accurate after adjustment; and 760 (or 32 per cent.) were rejected or absolutely condemned. He pointed out that the Electric Lighting Acts did not specify that the meters must be examined and certified; and the consumer had no protection whatever. Correspondents in one of the electrical papers had admitted that they could not rely on their meters very long after adjustment. Gas-meters, on the other hand, were tested by the Government and stamped periodically. Therefore he claimed that reliability, convenience to the consumers, and honesty of measurement were on the side of gas.

Mr. Downing considered gas had objectionable features in houses and theatres, especially when anything went wrong with the fittings.

Mr. Taylor pointed out that gas gave warning when anything went wrong; its odour furnished indication of an escape, which must be attended to without delay. Hence its great safety. Injuries or damages from gas explosions were comparatively few. There had been only 24 deaths attributable to gas in twelve months in the whole of the country. There was far more danger by fire from electricity than from gas. Special regulations were not necessary for gas. Electricity was an unruly element. Fires resulting from the fusing of wires had been numerous, and very destructive to property as well as to life.

Mr. Lovell asserted that lighting by electricity was an absolute necessity in some of the modern industries of the country. He said it was important to note that the breathing space required by the Home Office in buildings, workshops, and other places, was 400 cubic feet per individual; but where electricity was the lighting medium only 250 cubic feet were necessary. There was so much to be said in favour of electricity that he suggested an adjournment of the debate.

The Chairman asked the meeting if the debate up to that point should be wound up, and an adjournment agreed upon.

Mr. A. L. Holton (the Secretary of the Manchester and District Junior Gas Association) said it had already been determined that the subject of "lighting" only should be discussed that night. Heating and other purposes for which gas and electricity were used might be taken at some future date. Compared with electricity, gas had fewer disadvantages; and he contended that this illuminant had more than held its own that night. He commented upon the probable duration of the coal supplies of the country, and referred to the valuable bye-products obtained from coal in the shape of coke, sulphate of ammonia, &c., the disposal of which greatly reduced the cost of raw material, from which they had also the valuable asset of gas. Electricity was not to be compared with gas in these respects. He ventured to think those of his electrical friends who held gas shares would not sell them the next day, and invest the money in some electric light undertaking.

An Electrician gave statistics of broken mantles and chimneys in Stretford, and said they showed that gas was not so reliable as it should be. On examining 41 arc lamps, only one had gone out. He had visited a number of shops, and made inquiries with respect to gas and electric lighting. One shopkeeper had become disgusted with gas-mantles, having used 30 for nine lights since the beginning of the present year. At another shop 17s. had been paid for mantles in one week. It was significant that an Oldham gas engineer had had the electric light in his house for three years. Before then he had the decorators in once a year; now once in three years was sufficient.

The Chairman said he congratulated himself on having had the pleasure of being present at the discussion. He should not attempt to follow the figures that had been placed before the meeting; they had not been given with more than the usual exaggeration. Coming to individual speakers, as a mere matter of oratory—he said it with all respect—he thought the gas people "had it." On the point of "abuse," honours should be declared "even." In originality and phraseology, there were good points on both sides. The palm of victory for individual advancement in the regions of oratory must be given to Mr. Thorp, though he (the Chairman) did not accept his figures. The differences he had given between the cost of the two systems of lighting were too extreme. Mr. Roberts had spoken very well on the electric side; but in his case, judging from experience, he (the Chairman) did not consider his figures quite borne out. Shopkeepers did, and would, use electric lights; and in decorated rooms electricity was a boon. Carbon dioxide was produced by arc lamps; and they had to suffer from nitric acid from electricity as well as from carbonic acid from gas. Mr. Hollingworth had made a good point in his observations as to the uses of gas for heating in houses, halls, and factories. Gas vitiated the atmosphere more than electricity; but the heat could be utilized for ventilating purposes, and this should be done. There were dangers in both systems of lighting; he used both in his own house. In his bedroom he found it more convenient to burn gas. In ordinary lighting, he thought electricity had the advantage. He had not been moved by any of the arguments for cheapness. If one illuminant was cheaper than the other, there certainly were compensating advantages.

A hearty vote of thanks was passed to Professor Dixon for his services as Chairman, and the debaters separated.

"CLIMAX" HYGIENIC GAS-STOVE AND STEAM-BOILER.

This combined stove and steam-boiler (Messrs. Rigg and Spencer's patent) is designed to enable gas to be employed under circumstances to which well-grounded objection and some prejudice have hitherto frequently been offered by the public.

For heating and humidifying the atmosphere of conservatories and greenhouses, a long and exhaustive series of tests have proved the patentees' ingenious system to be completely successful; and for the disinfection and fumigation of rooms, it supplies the means of humidification known to be necessary to cause sulphur fumes to be effective in the destruction of the disease germs. Many other purposes to which the system can be applied will suggest themselves—such as the warmth of one room being obtained from the stove, and of an adjoining one from the combined fume and steam condensing tube, shown in figs. 4, 5, and 6 [next page].

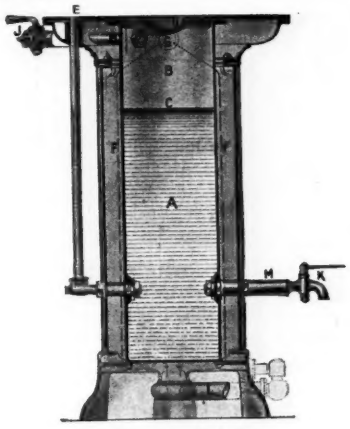


Fig. 1.—Section.

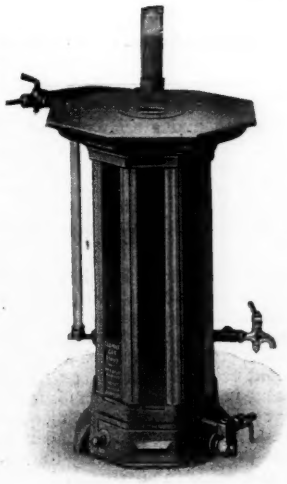


Fig. 2.—Complete with Iron Casing.

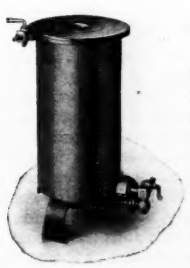


Fig. 3.—For Disinfection and Fumigation.

The section (fig. 1) explains the construction. The boiler contained within the casing is heated by a gas-ring, which obtains air for combustion from outside the conservatory, as seen in figs. 4 and 5. The fumes pass into the fume-tube G (fig. 1); and,

pending steam being raised, a natural exhaust by the vertical tube (figs. 5 and 6) carries them through the roof. In the section, the water A is automatically kept supplied to the correct level by the ball-valve tank shown in figs. 4, 5, and 6, allowing a steam space B; the lid being of sufficient weight to maintain the required pressure of about 1 lb. per square inch ascertained to be correct in providing the humidification from the jet J, and alternatively exhausting fumes, and heating the circulating fume and steam tube; it is best shown in figs. 4 and 5.

To prevent the possibility of gas fumes or the products of combustion entering the conservatory, the base of the stove containing the gas-ring is enclosed; and the air that is required for combustion is drawn from outside through the tube which is shown in figs. 4 and 5.

Steam passes by the tube H (fig. 1) to a three-way cock, which permits of its being directed either through the jet to cause any desired degree of humidity, or into the fume and steam condensing tube; but this tap cannot be closed—thus supplying one of three safety-valves. A second, E, is seen in the section, and in the perspective view (fig. 2) in the open top glass water-gauge; and the third is the large boiler-lid D, the weight of which determines the low pressure steam required for the purposes of this combined stove and steam-boiler. The stove is designed to dispense with the necessity for coal-fired boilers and their attendant objections, as well as the employment of cast-iron circulating-pipes, having water-troughs cast upon them for humidifying the atmosphere.

As the degree of humidity obtained can be regulated to the greatest nicety, it will be at once appreciated how valuable the system will be in hospitals and sick rooms occupied by bronchial and asthmatical patients. It is also suitable for offices, private houses, studios, and for inducing the necessary degree of humidity in the spinning of cotton, llama, wool, and silk.

With regard to gas consumption, the two sizes now being offered by the Falkirk Iron Company, the sole licensees (of No. 67, Upper Thames Street, E.C.), consume less than 7 cubic feet per hour.

Moisture of the atmosphere being essential for effectual disinfection, the small stove in a portable form (fig. 3) has been constructed for this purpose. The vertical fume-tube is here unnecessary; and the gas-connection is made by an india-rubber tube—the water being fed into the boiler through the lid. Fumigation is effected by the addition to the water in the boiler of any volatile germicide or antiseptic desired. The merits claimed for the stove in this form should cause it to be a matter of special interest to the medical officers of county and borough councils, boards of guardians, and sanatoriums.

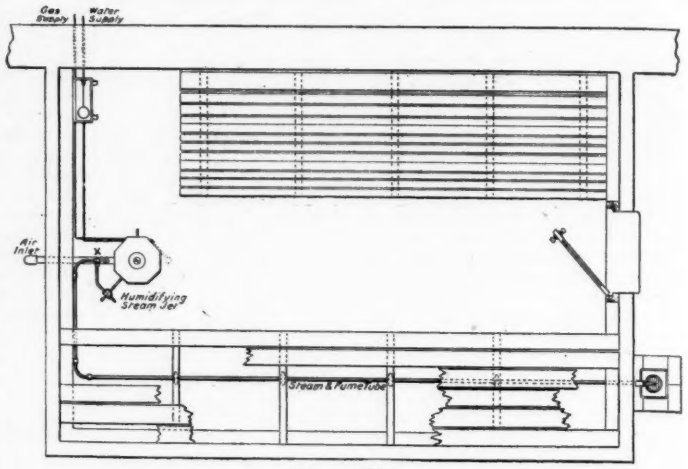


Fig. 4.—Plan.

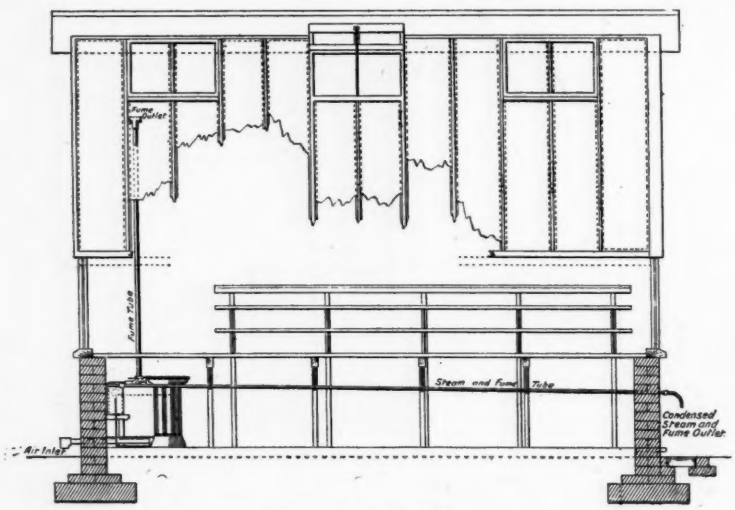


Fig. 5.—Front Elevation.

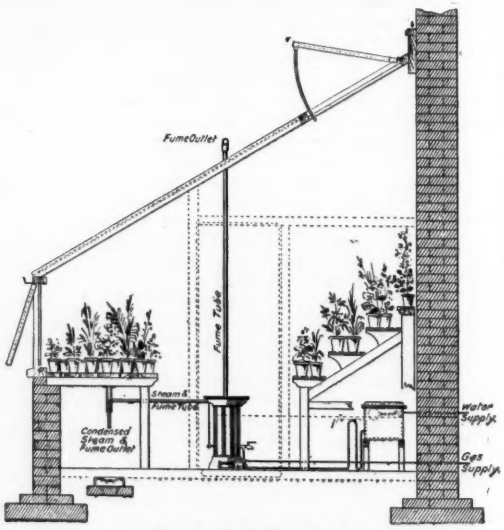


Fig. 6.—End Elevation.

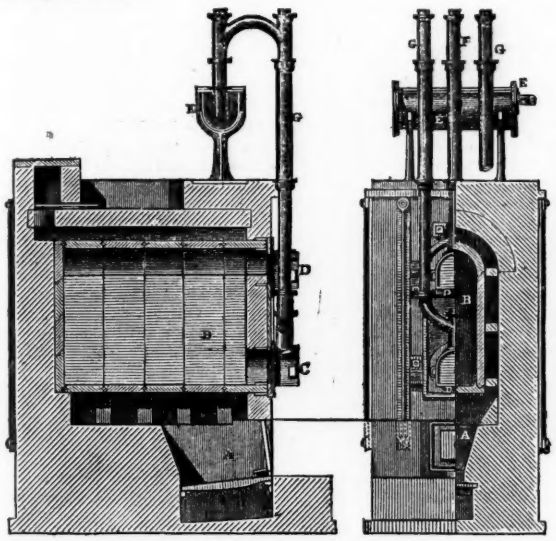
Test for Iron and Steel Pipe.—Iron and steel pipe may be readily distinguished by a flattening test, according to statements made at a recent meeting of the American Society of Heating and Ventilating Engineers. Soft steel pipe, cut in very short lengths or rings, flattens smoothly and evenly without breaking; while wrought-iron pipe usually fractures at two or more places when flattened.

Calcium Carbide.—We learn that a patent has been taken out by an American for a process of manufacturing calcium carbide, according to which the molten substance when tapped from the furnace is poured into moulds coated internally with finely-powdered coke, wood-charcoal, or lamp-black. The idea of the invention is that the semi-fluid carbide shall react with the carbon; the excess of lime present in the substance as it leaves the furnace being thereby decomposed, and a corresponding quantity of fresh carbide being formed. It is stated that, under the conditions mentioned, the reaction proceeds so violently that the liberation of the oxygen causes the carbide to effervesce.

A Specification for Coal-Tar Creosote.—A specification for coal-tar creosote proposed some years ago by Herren von Schrenk, Fulks, and Kammerer is brought to attention by them in a paper in a recent issue of the Bulletin of the American Railway Engineering and Maintenance of Way Association, in connection with a discussion as to the results of an investigation of the changes due to exposure in coal-tar creosote. According to an abstract in "Engineering Record," the investigation led to the conclusion that the actual chemical composition of the constituents of a creosote oil is of minor importance in securing the indefinite preservation of timber, as compared with the constituents which have high boiling-points and so guarantee the greatest possible stability. The reduction of the low-boiling fractions is desirable as much as possible, consistent with obtaining an oil which will be fluid enough at all working temperatures. This the specification aims to secure, leaving out the question of the chemical properties of components, and dwelling upon the necessity for obtaining fractions of a high boiling character as determined by fractional distillation. The specification is as follows: "The oil used shall be the best obtainable grade of coal-tar creosote—that is, it must be a pure product of coal-tar distillation, and must be free from admixture of oils, other tars, or substances foreign to pure coal tar; it must be completely liquid at 38° C., and must be free from suspended matter; and the specific gravity of the oil at 38° C. must be at least 1·03. When distilled according to the standard method—*i.e.*, using an 8-oz. retort, asbestos covered, with standard thermometer, the bulb ½ inch above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give no distillate below 200° C., not more than 5 per cent. below 210° C., not more than 25 per cent. below 235° C., and the residue above 355° C., if it exceeds 5 per cent. in quantity, must be soft, The oil shall not contain more than 3 per cent. of water."

A VERTICAL OVEN RETORT.

Apparently unnoticed in the "JOURNAL" at the time, a proposal was made away back in 1861 for an arrangement of gas-retort which was said to "combine economy of labour and material with the production of an increasing quantity of gas"—just the same claims as are put forward for the various vertical retort systems at present being experimented with. The particular arrangement referred to—the patent of Mr. William Richardson, of Dudley—was described and illustrated in a magazine (not now published) entitled the "Practical Mechanics Journal," the issue of which for Aug. 1, 1861, gave the following account of the construction of the retorts shown in the engraving now reproduced.



The peculiar feature of this retort is that it may be charged three or four times in succession with fresh coal before withdrawing the coke. The engravings represent two sectional views of the improved retort. The furnace A is constructed in the ordinary manner; and above this is arranged the retort B, the height of which is considerably increased as compared with retorts of the ordinary kind. The retort is provided with double mouthpieces C and D, the upper one of which communicates by a single vertical pipe F with the hydraulic main E. The lower mouthpiece C opens into the duplex vertical pipes G, which also dip into the hydraulic main.

In working the retort, the coal from which the gas is to be obtained is first charged through the lower mouthpiece, and the end cover is luted in the usual way. After this charge is worked off, the next charge is put into the retort through the upper mouthpiece, and upon the heated coke of the first charge. As the gas is evolved from the second charge of coal, it descends through the hot coke and passes off by the duplex pipes F into the hydraulic main. The escape of the gas in this direction is owing to a difference which is made in the dip of the vertical pipes, which admits of its escaping more readily by the lower mouthpiece.

This arrangement results in producing a larger yield of gas with less tar and ammoniacal liquor. The quality of the coke is also improved in density; and it is consequently more valuable, because it is better suited for general use.

The retort may be worked with a third or fourth charge of coal before withdrawing the coke; and in this way a considerable saving of labour is effected, as well as economizing heat. The advantages of Mr. Richardson's retorts are so evident, that we ["Practical Mechanics Journal"] doubt not of their coming into general use.

Tests of Ferro-Concrete.—A series of tests on a ferro-concrete beam and stanchions manufactured by the Improved Construction Company, of Stroud, have lately been carried out at the works of Messrs. David Kircaldy and Sons, Southwark; and particulars of the tests have been given in the Engineering Supplement to "The Times." The beam tested was 16 ft. 6 in. long, 15 inches deep, and 10 inches wide; and the tests are of importance inasmuch as it is understood that a method has been perfected by which ferro-concrete beams of similar construction can be standardized. The weight of the ferro-concrete beam was 165 lbs. to the foot run, and it contained only 30 per cent. of the metal in a steel beam of the same dimensions. It was designed to carry a distributed load of 35 tons. On actual test its behaviour was satisfactory with a concentrated load of 17·5 tons, and the deflection at a slightly heavier load was 0·46 inch. The load was subsequently increased to 50,000 lbs., when the deflection reached 0·63 inch; but the permanent set was found to be practically negligible. A special feature of this system is the method adopted for strengthening the compression side of these beams.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Companies and the Mines (Eight Hours) Bill.

SIR,—May I suggest to gas companies in all parts of the country that they should follow the example of the Reading Gas Company (see enclosed telegram), and ask their Members of Parliament to speak and vote against the Coal Mines (Eight Hours) Bill; pointing out to them that this Bill, if passed, will seriously increase the price of coal, and therefore the price of gas, which will be detrimental to the whole people, at the behest of a small minority who need no protection? To pass the Bill would be a very serious step in the direction of the Socialist movement for a universal eight-hours day.

Feb. 29, 1908. GEORGE LIVESEY.

[ENCLOSURE.]

The following is a copy of the telegram referred to in the above letter:—

> Am informed Coal Mines (Eight Hours) Bill is to be read second time to-day. If passed, will greatly increase cost of coal, and consequently price of gas, which is now so largely used by working classes and others for cooking, lighting, &c. Also be most injurious to many industries depending on supply of coal, and handicap them in competition with foreign manufacturers who are not subject to similar restrictions on output of coal. We therefore trust you will see your way to speak and vote against measure.

The Proposed Change of Test-Burner.

SIR,—Having already put my views as clearly as I can, I am satisfied to leave them to the consideration of your readers; the more so as your editorial remarks, although they treat of many things, do not appear to me to touch my main argument. The kernel of the whole matter was most excellently expressed by Mr. Lacey, as reported in the "JOURNAL" last week (p. 486). He said: "They did not want to dispose of so many cubic feet of an indefinite mixture; they had to sell light, or heat, or both. If it so happened that the light was a function of the heat value, then what they should do was to sell as many British thermal units as possible for a certain sum. It did not by any means necessarily follow that they would be able to sell more thermal units with a low-quality gas."

Caxton House, Westminster, Feb. 28, 1908. ARTHUR VALON.

SIR,—With regard to your further remarks on this question, I consider you are getting away from the chief point involved. I contend that undertakings using the new test-burner, when the No. 1 is stipulated, are deriving a benefit to which they are not entitled; and therefore should make a reduction corresponding to the saving effected.

You say the usual testing clause defines the burner, and then adds "or such other burner as the Board of Trade may approve." Well, supposing this was so in every Act (which is not the case), I still think it would be advisable to share with the consumers the value of the benefit derived.

You say: "But twenty years after the incandescent mantle has been brought to practical perfection, those luminous-flame users should, and do in many towns where there are progressive gas undertakings, represent a very small percentage consumption." Now, these assertions are both incorrect. The best mantles obtainable are far from perfect; and there are still a large number of flat-flame users, even in London.

THOS. M. WALLER, Secretary,

Durham, Feb. 29, 1908. City of Durham Gas Company.

Disposing of Fouled Water from Gasholder Tanks.

SIR,—The evidence of Mr. E. H. Stevenson in the action against the South Suburban Gas Company, in which mention is made of the York Gas-Works, appears to have been based upon some misunderstanding, if your report of the proceedings is correct. It is true we have recently had repaired two holders where the tanks had to be emptied, and that both occurred during the time Mr. S. E. Stevenson was the Engineer. But my Director, Mr. Matthew Leaf, requests me to say that, in the first instance, the water was all emptied before Mr. Stevenson came, and there was no complaint about it whatever; and that in the second case the tank was emptied in precisely the same way as the first, and without any complaint. Hence there was no necessity to be "careful about taking the oil off the water before it was pumped away." As a matter of fact, nothing of the kind was done; for, as Mr. Watson, our Works Superintendent, says, there was no appreciable film in either of the tanks. Most of the water in both tanks was "syphoned," and the remainder pumped very slowly into the sewers; and no nuisance arose, either from the surface of the water in the tanks or in the sewers.

Feb. 28, 1908. JOHN H. HILL, Secretary and Manager, York United Gas Company.

SIR,—With reference to the above subject, I may say that my experience demonstrates that fresh milk of lime, if applied to the surface of the polluted water in gasholder tanks, by spraying or otherwise, will effectively render innocuous the aromatic and other so-called injurious compounds. If time be allowed for precipitation and subsidence, the water usually assumes a blueish-green tint; and, having no offensive or noxious odour, it may be safely admitted into sewers. Ground unslaked lime has likewise been employed by me with success in treating manufacturing refuse, or liquid waste, in order to avoid actionable pollution of river waters.

I am further persuaded that if you can induce gas managers to describe in your "Correspondence" columns their treatment and disposal of foul water in gas-tanks, the "shameful admission" of relying on the United States for "new ideas" in this regard, as reported on p. 494 of your last issue, will be heard no more.

34, *Victoria Street, S.W., Feb.* 29, 1908. C. E. JONES.

Coin-Meter Robberies.

SIR,—Noting your remarks, in the last issue of the "JOURNAL," on the above subject, it has been suggested that the experience in Great Yarmouth may be of interest to your readers.

Like other towns, when coin-meters are in operation, the difficulty has made itself felt here. Depredations became rife, and immediate precaution against theft and destruction of property had necessarily to be undertaken, in order to prevent the slot-meter system from becoming prejudiced in the eyes of the houseowners, if not for other reasons. The damages to houses occasioned by burglarious entrance is sufficiently annoying to landlords to bring about an indisposition to sign agreements.

With this experience of coin-meter robberies, a scheme was inaugurated with the view of the improvement of the conditions governing this important class of consumer. After the consideration of all the points similar to those mentioned in your article, it was decided to adopt the idea not particularly recommended in the article—viz., that of frequent collections. Enumerated below are the chief features of the system in operation here:

(*a*) We have collected at fortnightly intervals for the past two years or more.
(*b*) Our expenses by way of collection have not increased thereby.
(*c*) Again, our consumers do not object to the more frequent calls of the collectors; on the contrary, their requirements and irregularities of mechanism and supply receive more direct and prompt attention.
(*d*) The system provides also for fortnightly reports of unoccupied houses, and the immediate removal of the meters therefrom.
(*e*) Economy obviously results in the latter. Meters are better returned to the store than allowed to remain in untenanted dwellings (cleared of money or otherwise) as the means for the prey of the criminal meter-breaker.
(*f*) Moreover, our new system is properly so called a (14 days) cash system.

Any system of coin-meter collection by which moneys are allowed to accumulate in the meters for some three months, or more, now appears to us as being cash payment, and with all its advantages is discounted by the disregard of the value of the outstanding uncollected money, added to the fact that means are contributed to the end which in so many instances has to be deplored. Frequent collections mean ready money; and ready money must necessarily be useful to all gas concerns. Strong money-boxes attached to tin meter-cases will not, in our opinion, dismay the gentry responsible for the "growth of coin-meter robberies." We prefer here to remove, as far as possible, "the means to do ill deeds." We are glad to say that, in every respect, our system has been attended with excellent results.

WILLIAM J. CARPENTER, Secretary.

Great Yarmouth, Feb. 29, 1908.

Use of Fire Hydrants without Payment.

SIR,—I regret that no one has replied to the letter on the above subject in the "JOURNAL" for the 14th of January. It is a most important matter, and one in which I am much interested. May I ask the writer of the letter whether, in the event of the Rural and Parish Councils not paying, he will remove the hydrants. I understand that the Councils are protected if the hydrants are not paid for within three months; but this probably does not preclude the right to remove them, or prevent their use by the Councils. I shall esteem it a favour if "Water-Works" will kindly inform me, through your columns, how he proposes to deal with the matter.

Wallington, Feb. 26, 1908. WILLIAM COSTER.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills: The Llanelly Gas Bill and the Swansea Valley Gas Bill have been referred to a Select Committee, consisting of Lord Sanderson, the Earl of Westmorland, Earl Graham, the Earl of Cranbrook, and Viscount Hood; to meet next Tuesday.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Bromley and Crays Gas Bill, Derby Gas Bill, Draycott Gas Bill, Gosport Gas Bill, Leicester Corporation Bill, Manchester Corporation Bill, Southwell District Gas Bill.

The Bromley and Crays Gas Bill, Derby Gas Bill, Draycott Gas Bill, Garw and Ogmore Gas Bill, Gosport Gas Bill, and Swinton and Mexbrough Gas Bill have been referred to a Select Committee, consisting of Mr. Whitbread (Chairman), Major Ratcliff, Mr. Pearson, and Mr. Joyce; to meet next Thursday.

The petitions of the Surrey County Council and the Egham and Feltham Urban District Councils against the South-West Suburban Water Bill have been withdrawn.

In addition to the notices already given in regard to the Coal Mines (Eight Hours) Bill introduced by the Government, Mr. Laurence Hardy has notified his intention of moving, on the second reading of the Bill—"That this House, in view of the fact that miners have in the past been able voluntarily to adjust their hours of labour to suit the varying needs of the different mining districts, declines to proceed with a Bill which would limit compulsorily the hours of adult male labour, and which, by its effect upon the output and cost of coal, would injuriously affect all other industries in the country."

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting and the minutes of the last meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said: Ladies and Gentlemen, when we had the pleasure of meeting you in August, I mentioned that I scarcely expected that in the then current half year we should be able to earn sufficient to pay the interest on our borrowed capital and our full statutory dividend; but I am happy to say that the result is a good deal better than our anticipations, and that we come to you to-day to tell you that we were able to earn our full statutory dividend, with the help of the extra 1d. we charged for gas (which produced about £6700), and we have a surplus of £2334 to carry forward to the profits of the current half year.

TRADE OUTLOOK AND COAL PRICES.

In the early part of 1907, there was taking place all over the world an expansion in the trade and manufactures which had already been growing in the two preceding years. Two great wars and two severe earthquakes, by causing an enormous destruction of material, had led to great activity in the manufactories of the world, to replace the waste; and as a consequence there appeared to be—and to a large extent there actually was—a state of world-wide prosperity. This statement is borne out by the figures of our foreign trade, which in the year 1906, for the first time in the history of the country, exceeded £1,000,000,000, and in 1907 increased to £1,164,000,000. Our imports increased by £38,000,000, or over 6 per cent., and our exports and re-exports by £58,000,000, or 12 per cent. The iron and steel trades, which consume so large a proportion of our raw material, coal, shared in this general activity. In the year 1906, there was a very heavy demand for iron and steel, both for home consumption and for export purposes; and in the first three quarters of the year 1907, there was no decline in the demand—the factories in this country being all busy in fulfilling the orders they had already received and were still receiving. This activity naturally made itself felt in the coal trade; and the demand, both for home use and for foreign consumption, was of altogether an unprecedented character—the foreign consumption being fostered by the repeal of the coal duty, and also by the disaster which occurred in 1906 in the Courières Mines in France, which was followed by strikes which kept the coal pits in the Pas de Calais idle for some two or three months. In consequence, our exports of coal in 1906 rose to 62 million tons—an increase of 7 million tons over the year before, or 11 per cent. Of this quantity, France took 10½ million tons, Germany 10 million tons, Italy 8 million tons, and Holland 4 million tons. This was an increase on the part of France of rather over 1 million tons. Germany took 2½ million tons more; Italy ½ million tons more; and Holland 1½ million tons more. Of the remainder of the 62 million tons exported, Sweden, Egypt, Russia, Denmark, and Spain took 2½ to 3½ million tons each; and the rest was shipped in smaller quantities to India, the Argentine, and other distant countries. Now this very heavy demand for coal took place principally just at the time of the year when the gas companies are making their annual contracts; and it led to an advance of from 2s. 6d. to 3s. in the price, and to the coal owners being hard put to it to meet the orders which poured in upon them—and this in spite of the fact that the output of coal in the United Kingdom had risen between the years 1896 and 1906 from 202 million tons to 251 million tons, the increase in the output of the year 1906 over 1905 being no less than 15 million tons. Another result of the abnormal demand for coal was a large increase in the miners' wages, which, in accordance with the settlement of 1879, are based upon the price of coal. In 1905, there was no advance in miners' wages; in 1906, there was an advance of 5 per cent.; and in 1907, there was an advance of no less than 18¾ per cent. in South Wales and 21½ per cent. in Durham—the rate of wages reaching 60 per cent. above the standard of 1879, the maximum allowed by the settlement then made. In the last quarter of 1907, a great change took place. The demand for iron and steel from America and Germany suddenly ceased, and these countries began to press their products for sale in our markets; and though our factories were still busy fulfilling orders they had already received, fresh business began to fall off, and prices commenced to rapidly decline. The money stringency with which we are all familiar now—which took place in Germany no less than in America, and which was fostered by the over-trading and speculation which always occur in times of great prosperity—has led to a decline in the price of almost all commodities all over the world, and industries generally are beginning to feel the slackness of trade. A result of this is that the demand for coal is falling off, and prices are already declining; and the coal owners we find are beginning to make efforts to obtain orders for coal for the ensuing year. All this will lead—must lead—to a heavy fall in the price of coal. There is still some time before we have to make our annual contracts; and I look forward with confidence to our being able to buy our coal at very much reduced prices on what we paid last year. There are, however, some things which will possibly retard the reduction. One of these is the great advance in wages, and also the tendency which the men have in times when wages and employment are plentiful to take holidays at their own sweet will.

COAL MINES (EIGHT HOURS) BILL.

There is another thing which may affect the price of coal; and that is the introduction into the House of Commons of the Miners' Eight Hours Bill. Under the provisions of this Bill, the miners are prohibited from being more than eight hours from the time they leave the top of the pit to the time they return—except that sixty days in the year they may work an extra hour a day, and the Government of the day has power to suspend the operation of the Act in time of great

emergency. If the Bill does become law, it is obvious that it will place a tax on almost all the industries of our country, which are already put to it to meet the growing foreign competition; and it must perforce increase the price of bread and fuel and necessaries of life without which the masses of our population cannot exist. And it is proposed to inflict this hardship on the country in order to confer what is at best a doubtful benefit on a body of men who have never shown themselves backward in looking after their own interests. We, in conjunction with the Gas Companies' Protection Association, are organizing a deputation to the Home Secretary to point out to him the great injury which will be inflicted by this Bill on the consumers of gas, who will have to pay a considerable portion, as you know, of any extra cost that may be put on coal. There are one or two other Bills being privately promoted in the House of Commons which affect our interests, but so slightly that I do not think I need allude to them in detail. We are taking precautions to protect your interests there.

THE HALF-YEAR'S RESULTS.

As to the results of the half year. As I have already stated, I should not have been disheartened if we had not succeeded in earning our full statutory dividend. At the beginning of the half year, we scarcely expected to do so. But we were determined to strain every nerve to render it unnecessary to raise the price of gas more than the penny which we put on at the end of June. I am pleased—doubly pleased—to be able to report that our fears have not been fulfilled, and that we come before you to-day with the full statutory dividend and something over. I regret to say that the increases in the sales of gas are but small. During the first quarter, we had an increase of nearly 5 per cent., which was very satisfactory; but the last three months of 1907—and particularly the last month—brought abnormally fine and warm weather, and, as a consequence, our sales fell off to the extent of nearly 2 per cent. So that over the whole of the half year we only sold 13¼ million cubic feet more than in the corresponding period of 1906, which was equivalent to an increase of only 0·83 per cent., or less than 1 per cent. Our neighbours fared little better than this. The South Metropolitan Company had an increase of just over 1 per cent. —I think, 1⅛ per cent.; and the Gaslight and Coke Company had an increase of 1 per cent. We obtained 3236 new consumers during the half year. Our ordinary consumers are less by 6, but the coin-meter consumers are more by 3242. We have placed on the district 2618 additional stoves. Our ordinary consumers now number 24,054, and our coin-meter consumers 61,660—or a total of 85,714.

THE ACCOUNTS.

Turning to the capital account, there is again no expenditure charged to works; the only outlay being in the provision of services, meters, and stoves for the distribution of gas. The capital per million cubic feet of gas sold continues to show a slight but steady reduction, which is very gratifying to us. Coming to the revenue account, I think you will see evidence there that the results of the half year have been very satisfactory; and I should like to say emphatically that they reflect the greatest credit on our Engineer (Mr. Stanley H. Jones) and those who have worked so ably with him. The gas per ton of coals has gone up from 10,758 cubic feet to 11,246 feet, which is an increase of 488 cubic feet of gas per ton of coal. This is very good indeed, and is the result of good coals and good working. The coke made per ton of coal is also highly satisfactory. Our profit is only £489 less than in the corresponding half of 1906, and this in spite of the fact that we paid very much more for our oil and coals.

SALIENT POINTS OF THE REVENUE ACCOUNT.

Briefly stated, the salient points of the revenue account are as follows: We paid £16,145 more for coal and oil. Distribution cost us £2174 more—mainly because we had to supply so many more consumers. Management, you will see, is £1074 more. This is not very satisfactory; but the reason is entirely beyond our control. It was mainly due to two causes—one that we have placed a sum aside to a fund to meet any possible claims under the Employers' Liability Acts for accidents occurring to workmen, and the other that we had an explosion due to the carelessness of a workman which cost £700 or £800. Then on the same side of the account we saved in the case of manufacture £3519. Rates were £1117 less. I think it is the first time since I have occupied this position that I have ever had to say rates were less. I hope it will not be the last. Then £295 less was set aside for profit-sharing. The net cost was increased £14,688. On the other side of the account, we received £8843 more for the sale of gas, of which about £6700 was due to the extra 1d. charged. We received for rental of meters, stoves, and prepayment meters £2157 more; and coke came to our rescue, as it usually does when coal is dear, making the receipts from residuals £3299 more. This gave, with £22 miscellaneous items, a total addition to the receipts of £14,199. So that, as I say, we made up for the extra cost to within £489. The profit, you will see, is £64,037; whereas last year it was £64,526. This is sufficient to pay our interest and statutory dividend. We began the half year with a carry-forward of £23,503; and we end with a carry-forward to the account of the current half year of £25,837.

THE REDUCTION OF RATES.

I would like to allude just for a moment to the fall in the amount we have had to pay for rates. That is, I must say, largely due to the excellent work of the Ratepayers' Association in our district, which we have supported with funds. I look forward to this work being continued, and increased, in the future.

THE IPSWICH ASSESSMENT APPEAL.

There was a case decided in the Law Courts which is of great interest to gas companies. It is known as the "Ipswich case," because it was an appeal from a decision of the Rating Authorities in the Borough of Ipswich. They claimed that prepayment meters, stoves, and fittings should be regarded as landlord's fixtures in making an assessment, and so were assessable. The Divisional Court, however, decided that they were to be regarded as tenant's fixtures, and therefore as not rateable. This is a matter of great importance to gas companies, because we all of us have much capital invested in these things.

THE OUTLOOK.

I am happy to be able to tell you that our relationship with the workmen leaves nothing to be desired. The last few years there has been a growing feeling of mutual confidence and friendship; and it shows itself in the good work which is willingly given to us. With regard to the future, there are, so far as I can see, no clouds upon the horizon. I think we shall buy our coals at greatly reduced prices; and in spite of the fact that the warm weather since the beginning of the year has not been favourable to the sale of gas, when we meet you again, as I hope we shall do, in August, I trust the revenue account will show a good balance on the side of profit.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter), in seconding the adoption of the report and accounts, remarked that the Chairman had gone so exhaustively into everything connected with the Company, that little was left for anyone else to say. He cordially agreed with what had been said about the Eight Hours Bill, and could not understand how any man in full possession of his faculties could wish to have his output restricted by statute. He also wished to congratulate them specially on the results of the past year's working. They happened to be in a particularly advantageous position. Some years ago, they had a very able Engineer and man of business in Mr. H. E. Jones, whose mantle fell upon his son; and he (the speaker) was quite certain that this son was worthily following in the same path, and giving evidence of great administrative ability. They were also very fortunately situated in having as Chairman the able son of an able father who was himself for many years Chairman of the Company.

SHAREHOLDERS' REMARKS.

Mr. GEORGE ENNIS remarked that the 1s. per ton export duty on coal, which had been so absurdly thrown overboard by the Government, might instead very well have been enlarged, so as to afford some relief by way of a reduction of the income-tax. As to the iron trade, it must be acknowledged now that the prosperity in 1906 was of the most ephemeral character; the manufacturers' boom had gone. He was glad to hear of the work of the Ratepayers' Association; and he hoped the deputation to the Home Secretary in conjunction with the Gas Companies' Protection Association would be a success. He concluded his remarks by congratulating the Directors on the report, which was most satisfactory in every sense. It reflected great credit on the Board and on the staff in every possible way.

Major R. S. E. DOLL asked how it was that they had such a large quantity of unaccounted-for gas. If the fault was with the mains, he suggested that something should be done to stop it. When the deputation waited on the Home Secretary, he did hope they would drive home the absurdity of this Eight Hours Bill.

The CHAIRMAN said that, with regard to the unaccounted-for gas, it was less than usual. It was only just over 5 per cent., which was quite a small figure. Of course, it was impossible to account for all the gas manufactured. They had to estimate for the public lamps, as there was not a meter fixed to each one; and perhaps there was a little variation here. If the figure was compared with that of some of the foreign companies, it would be seen how small was the percentage of their own undertaking.

The resolution was then carried unanimously.

DIVIDENDS AND RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends were declared for the half year at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock, and 5 per cent. upon the 3½ per cent. stock—both less income-tax.

Sir JOHN COLOMB moved the re-election of the retiring Directors (Messrs. W. G. Bradshaw, Walter Hunter, and R. Y. Bevan).

Mr. J. G. PILCHER seconded this; and it was agreed to.

On the proposition of Mr. T. WILKINS, seconded by Mr. S. W. SAVAGE, the retiring Auditor (Mr. G. W. Ilsley) was re-appointed.

VOTES OF THANKS.

Mr. ENNIS proposed, and Major DOLL seconded, a vote of thanks to the Chairman and Directors; and it was heartily accorded.

The CHAIRMAN briefly replied, and moved that the best thanks of the meeting be given to the officers, staff, and workmen of the Company. He said the accounts spoke more eloquently than he could of the work that had been done during the past half year. From every point of view it was entirely satisfactory to the Directors. He was especially pleased at the good work that Mr. Stanley Jones did for the proprietors. He also coupled with the vote the name of their able Secretary, Mr. Ellis.

The DEPUTY-CHAIRMAN seconded the vote; and it was cordially agreed to.

Mr. H. D. ELLIS, in returning thanks for himself and the clerical staff, remarked that there had been several allusions to the growth of the Company. There was one point he thought would interest the proprietors. There was a profit-sharing scheme; and the employees were shareholders. Well, he became Secretary 29 years ago; and there were now more shareholders among the workmen than there were when he first came in the whole body of proprietors. This illustrated to some extent the growth of the Company. With regard to the unaccounted-for gas, when they looked at figures in thousands they appeared formidable; but when they considered them in percentages, they seemed different. In the case of the Gaslight and Coke Company, the figure was a large one, but the percentage was very small, and it would not be possible to reduce it. The business was, however, so huge that the unaccounted-for gas exceeded the whole of the gas used in the illumination of Brighton. This well illustrated the enormous figures concerned.

Mr. STANLEY H. JONES thanked the proprietors on behalf of himself and the engineering staff. He said the working of the Company during the past half year had been the source of the greatest gratification to them all. The men, he was sure, had put their shoulders to the wheel even more than usual. A year ago he told the proprietors that if the price of coal rose they would do their best to meet it as much as possible. They had endeavoured to do this; and he thought they had succeeded. With regard to the question that had been

raised as to the leakage, it was a matter of surprise to him personally that it was so small. Theirs was a most peculiar district. They were tunnelled with railways, there was a lot of heavy traffic, and road levels had been lowered; and with nearly 280 miles of mains and 86,000 services, it was a matter of astonishment to him that there was not a larger leakage.

This concluded the meeting.

WEST HAM GAS COMPANY.

A Large Increase in Business—Projected Further Capital and Extensions—Coalite.

The Half-Yearly Meeting of this Company was held last Tuesday, at the Liverpool Street Hotel, E.C.—Mr. J. LISTER GODLEE in the chair.

The SECRETARY (Mr. A. G. Snelgrove) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, having referred to an accident that befel the Deputy-Chairman of the Board (Mr. T. S. Geere) two or three weeks ago (from which he is happily rapidly recovering), alluded to a leaflet distributed with the Directors' report and accounts, entitled "A Chapter of Local History." From this he hoped the shareholders had been interested in marking the progress of the Company from small beginnings, with 84 shareholders and 6s. gas, to their present position with 1600 holders of stock and debentures and 2s. 9d. gas—showing that the Directors in 1856 were not bad prophets when they anticipated "the event of favourable circumstances in the progress of the Company towards that magnitude which is ever connected with greater economy of manufacture." While the proprietary had benefited by the change, he thought the Directors might also claim that they had kept the undertaking given by their predecessors that "the best interests of the customers shall never be lost sight of." When he addressed the shareholders last August, he stated that they had not up to that time found it necessary to increase the price of gas; but he spoke with due caution as to the future in view of the price of coal, the high cost of which was perhaps the most important factor in connection with their business that was then present to their minds. The accounts showed, he thought, satisfactorily that the Directors were justified in the course they adopted, and nothing had yet occurred to lead them to make any change in the price. The high figure at which the present coal contracts were made would somewhat more seriously affect the current half year than it had affected the one just closed, as some of the cheaper coal under the former contracts was used in it. But, without pledging himself as to the future, he very much hoped that the price of gas would continue unchanged for the present; and so far as they could judge, there seemed every prospect of coal prices becoming easier in the coming spring. Dealing with this question, it was impossible to ignore the possible effects of the Miners' Eight Hours Bill (recently introduced in the House of Commons by the Home Secretary) should it become law. This Bill—which seemed to be an attempt to protect a body of adult men, well organized and well able to look after themselves, from the overwhelming temptation to overwork themselves—might, if it came into operation, lead to a permanent increase in the price of coal, which would affect, in greater or less degree, not only makers and consumers of gas, but all classes of the community. It was too early yet to attempt to predict how great its effect might be. The Directors were making arrangements for the Company to be represented on a deputation from the gas companies to the Home Secretary on this question. Directing attention to features of the accounts, he said, as the Board anticipated, the half year had exhausted the balance that was standing to the capital account, which, as would be seen, was slightly overdrawn on Dec. 31. The Directors would take steps very shortly to issue part or all of the stock and debenture stock created at the last meeting; and they could only hope that the state of the Money Market, when the time came, might enable them to do this on satisfactory terms. The capital employed by the Company had decreased last year from 13s. 4d. per 1000 cubic feet sold to 12s. With an increase in the make of gas of about 10·74 per cent. over the corresponding half of 1906, the cost of coal and oil had increased by £8400, while the receipts from residuals had increased by about £3000. The result was that the net cost of coal and oil had been raised 0 85d. per 1000 cubic feet of gas sold. Dealing with the accounts for the whole year, they found that, in that period, while coal, &c., had cost them 0·63d. more per 1000 cubic feet of gas sold, the carbonizing wages had been reduced from 2·81d. to 2 71d.; and the total cost of manufacture had gone down from 8·68d. to 8·31d., or about ½d. per 1000 cubic feet of gas sold. The 1814 million cubic feet of gas made during the year showed an increase of 10·74 per cent. over 1906; the increase of gas sold being almost the same—10·75 per cent. The number of consumers had increased by 630 ordinary meters (such consumers at present amounting to 22,661), while those using slot meters now greatly exceeded them, numbering some 33,255, or between 7000 and 8000 more than a year ago. The last few weeks had shown some falling off in the new applications for these installations. Whether this arose from some temporary cause, or whether they had, in fact, come into possession of most of the absolutely unoccupied country that they entered upon some five years ago, it was not possible at present to decide. If it should point to any permanent decrease in the number of new customers in this direction, its result would be shown in a decided diminution in the rapidity of the expenditure of capital. The sale of gas through these meters had been at the rate of 8000 cubic feet per meter during the last six months, which was very satisfactory. The shareholders, however, would not need reminding that many of the users of these meters belonged to a section of the population who moved about pretty frequently; and while one tenant of a house might like to use gas, his successor might not. The result was that while in five years they had made some 37,700 such installations, only 33,200 of them were in work—leaving a difference of 4516 now out of work. During the year, they had laid 6 miles of new mains, and relaid about ¾ mile. Among the new mains had been one leading out of the East Ham land towards the northern part of the district, which had enabled the Company to very much improve the supply to that district from the large gasholder there. At present they had not erected any manufacturing plant at these works; the water-gas plant at West Ham having enabled them to carry on all their manufacture from that station. But they could not have dealt in this manner with the requirements of their area without the gasholder at East Ham; and the Board were now considering the erection of a second holder on the estate. The sales of gas since the end of the year showed an increase of 5·65 per cent. over last year. The subject of Coalite had not been quite so much in evidence lately; and the producers of other smokeless fuel did not find at present any great demand. It would seem that the Company had found some difficulty in disposing of the gas that was produced as a bye-product in the manufacture. As a way of getting rid of this, the Coalite Company deposited a Bill in Parliament authorizing them to sell gas, for power purposes only, in a large district in the East of London, including part of this Company's area of supply. It would have been necessary for the Directors to offer the most strenuous opposition to this attempt to introduce a rival gas company into the district. The Directors took the preliminary step for this; but they received notice, before they had presented their petition against it, that the Bill would not be proceeded with. They were thus saved from a parliamentary fight, which, although they had reason to anticipate success, must have proved costly and troublesome. Regarding further powers on behalf of their own Company, the Board had not yet come to any decision as to whether or not they must promote a Bill next autumn. This would depend on the operations of the current half year; and any material falling off in the demand for new slot-meter installations might enable them to postpone action for another year. The shareholders would be informed in due time of any steps the Directors might think it necessary to take in this matter. Sympathetic reference to the death of one of the Auditors (Mr. John Brooks), who had held office for 30 years, followed; and, in his concluding remarks, the Chairman said the officers of the Company were still working with their accustomed energy and loyalty. Some of the younger members were displaying genius in the production of advertisements to counteract the brilliant imagination of the electricians in this matter; and the successful progress of the Company's business in the future appeared to be well secured. He then formally moved the adoption of the report and accounts.

Mr. H. CECIL PELLY seconded the motion. In doing so, he said he thought the result of the half-year's operations was very satisfactory—considering that they had had dear coal and oil to contend with, and that the price of gas had not been increased. This enabled them to look forward with confidence to the future, particularly seeing that there was every prospect of the coal market becoming easier.

Mr. JOHN MEWS was pleased to hear the Chairman talk in the manner he did regarding the Miners' Eight Hours Bill. Gas companies were extremely interested in this matter; and the ordinary man was interested—the very poor who had to buy their coal in small quantities would particularly be made to feel it. It was purely a socialistic measure; and really only meant about six-and-a-half hours work a day and not eight. Concerning Coalite, he did not think much more would be heard of it. He was glad to see their own business in such a satisfactory condition.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. F. NICHOLSON, dividends at the rates per annum of 5 per cent. on the preference stock and £5 2s. 6d. on the consolidated ordinary stock were declared.

Moved by the CHAIRMAN, and seconded by Mr. T. H. GEERE, Mr. H. C. Pelly was re-elected to his seat on the Board; and Mr. F. Nicholson was likewise returned, on the motion of the CHAIRMAN, seconded by Mr. KEEN.

Moved by Mr. CLEVERLEY, seconded by Mr. GEERE, Mr. Edward Charlton was elected Auditor, in succession to the late Mr. Brooks.

On the proposition of Mr. WIGLEY, seconded by Mr. T. WILKINS, the services of the Chairman and Directors, and of the Engineer and General Manager (Mr. John Clark), the Secretary (Mr. A. G. Snelgrove), their respective staffs, and the workmen were very heartily acknowledged.

This terminated the proceedings.

TYNEMOUTH GAS COMPANY.

Progress of the Undertaking in the Past Twenty Years.

The Forty-Second Annual General Meeting of this Company was held at the Offices, North Shields, last Tuesday—Mr. J. B. WILLIAMSON, J.P., in the chair.

The SECRETARY (Mr. J. J. Carr) having read the notice convening the meeting, the report of the Directors was presented. It was stated therein that the make of gas in the past year was 19 196,400 cubic feet, or 4·39 per cent., more than in 1906; while the number of ordinary and prepayment consumers had increased to 17,926, or 1470 more than at the close of the preceding twelve months. Encouraged by the immense popularity of the system of letting out cooking-stoves on hire, the Directors had decided to extend it to gas fires, boilers, and radiators. The revenue from the sale of gas was £45,315, against £41,567; and from residuals £20,433, compared with £17,201. The total revenue for the year was £68,863, and the expenditure £59,227; leaving a balance of £9636 to go to the profit and loss account. This added to £8151 brought forward made a total of £17,787. Interim dividends, at the rates of 5 and 4 per cent., amounting to £5047, had been paid; and it was proposed to pay final dividends at similar rates. This would leave a balance of £7691 to be carried forward.

The CHAIRMAN, before moving the adoption of the report, said he should like to outline some of the great changes which had taken place, both in the method of making and in the use of gas, during the last twenty years; his reason for doing so being that he would attain his majority in the service of the Company as a Director in May next, and that during twelve years of this time he had been Chairman. The incandescent mantles and burners had then just been invented by

Welsbach; but, owing to their high cost and unreliability, they did not appeal to the public; and it was not until about five years later—in 1891—that any great improvement in their manufacture was effected. Even then it was several years before they came into general use. With this improved mantle it might have been thought that the last word in incandescent lighting had been said; but the recent unexpected advent of the inverted shadowless mantle and burner had again given an enormous impetus to lighting by gas. He believed he was one of the first in the town to try incandescent gas lighting. The cost of the burner was 21s., and the mantles cost 2s. 6d. each. They were very fragile; and the light given was poor in comparison with that obtained from the modern mantle, costing a few pence, with which they were now so familiar. Cooking by gas was then practically unknown in Tynemouth. Now they had 7949 cooking-stoves out on hire. Prepayment, or penny-in-the-slot, meters had come into use only within the last eight or nine years; and the convenient and economical gas-fires, as they knew them, were a very recent invention. All these changes had helped to give gas an important and necessary place in domestic life, and had stimulated its general use enormously, particularly with regard to the "day load," as it was called. When he joined the Board in 1887, the quantity of gas sent out other than for lighting purposes was practically a negligible quantity; the result being that in the daytime and during the summer months very little gas was used, and consequently a large portion of the producing and distributing plant was idle and unproductive. Now the demand for gas during the daytime in winter for cooking and heating, and in summer for cooking mostly, had increased greatly. This change ensured a more even distribution of make during the year, as well as a larger return upon the capital invested in the works and other plant than was possible formerly. The quantity of coal carbonized in 1887 was 18,800 tons, against 42,000 tons last year—an increase of 23,200 tons, or 124 per cent.; while the gas made was then 174 million cubic feet. Last year it reached 457 millions, or an increase of 162 per cent. The gas made per ton of coal, which was then 10,350 cubic feet, last year reached 10,790 cubic feet—an improved yield of 440 cubic feet, or 4·2 per cent. The gas sold per ton of coal was still more striking. In 1887 it was 9032 cubic feet, compared with 10,095 cubic feet last year—showing an improvement of 11 per cent. The quantity of coke sold in 1887 was 6500 tons, against 23,444 tons last year; giving an increased sale of 260 per cent. But if they took the coke sold for each ton of coal carbonized, they found that while in 1887 they only had 6·38 cwt. available for sale, they now had 10·74 cwt., which was an improvement of no less than 68 per cent. The yield of sulphate of ammonia also showed a great improvement. They used to get 17 cwt. from every 100 tons of coal carbonized; now they had 20 cwt., representing an increase of 17 per cent. In 1887 they paid for coals £5808, and got back for residual products £3256; being 56 per cent. of the cost of coals. Last year their coal bill came to £25,474; and they received back for residuals £20,433, or 80 per cent. of the cost of the raw material. When it was remembered that they were now paying nearly twice as much per ton for coal as they did in 1887, it would be understood what an important factor the residual products had become in helping to meet this largely increased cost for coals. These improved yields of gas, sulphate of ammonia, and coke had only been made possible by the modern method of manufacture adopted in the new works, which were opened in 1903. The introduction of regenerator settings of retorts, automatic stoking machinery, and other labour-saving appliances, had not only reduced the cost of manufacture, but at the same time had vastly improved the conditions under which the men performed their work. Turning to the report and accounts for the past year, it would be noticed that though only 2148 tons of coal more had been carbonized, they had cost £6779 more than in 1906. Fortunately, residuals had done unusually well, giving £3232 more; and there had also been a substantial increase in the sale of gas. Repairs and renewals had cost less, owing to the high state of efficiency in which the works and distributing plant had been maintained. These favourable results had rendered any increase in the price of gas unnecessary. In this connection, the shareholders would be glad to know that part of the Company's requirements for coal had already been secured at a considerable reduction in price; and as there seemed every likelihood that coals would go still lower, the Directors hoped to secure on favourable terms the remaining quantity necessary. Should their hopes be realized, the low price of 2s., less discount, at which they were now selling gas need not be disturbed. The largest quantity of gas sent out in one day during the present winter was 2,055,000 cubic feet—an increase over the best day of the previous year of 165,000 cubic feet, or 8·13 per cent. The quantity of gas made during the year under review was 456,848,000 cubic feet; exceeding that of the previous year by 19,196,400 cubic feet, or equal to 4·39 per cent. These continued yearly increases in the make of gas, together with the improved working results achieved in the new retort-house, had proved so satisfactory from a financial point of view, that the Directors, on the advice of their Engineer (Mr. W. Hardie) decided to equip the remaining half of the house. Twelve additional settings of retorts, together with the necessary machinery, were now being installed. The work was well forward, and the new plant would be ready for use in the coming winter; so that the whole of the gas required for the next few years would then be made in the new house. It would be capable of producing 2½ million cubic feet of gas per day after this addition. The work of remodelling the old building, and installing regenerator settings of retorts, together with the necessary automatic stoking machinery, &c., would be proceeded with as required, so as to modernize and bring this portion of the manufacturing plant into line with the new works. The net profit on the year's working was £9636; and after adding the balance brought forward of £8151, there remained available for dividend purposes £17,787. The payment of the dividends proposed would reduce the balance from last year by only £459, which must be considered very satisfactory when it was remembered that nearly £7000 more had been paid for coals. He was sure it was the wish of the shareholders that their hearty thanks should be tendered to the Manager and the Secretary, with their respective staffs, as well as to the men, for the excellent way in which one and all had worked during the past year. He moved the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. Shallett J. Crawford) seconded the motion; and it was carried unanimously.

The dividends recommended having been declared, and the retiring Directors and Auditor re-elected, a presentation was made to the late Assistant-Engineer (Mr. A. Clement Hovey), who has left Tynemouth for Milan. This pleasant conclusion to an unusually interesting meeting is noticed elsewhere.

SOUTH SHIELDS GAS COMPANY.

A Year of Records.

The Annual General Meeting of this Company was held at the Offices last Friday—Dr. J. F. ARMSTRONG, J.P., in the chair.

In the report presented by the Directors, they stated that the sale of gas to ordinary meter and prepayment consumers had not only been the largest on record—viz., 452,787,733 cubic feet—but the percentage increase over the previous year (6½) was the largest attained for ten years. The cost of coals carbonized showed an advance of £6199; but the increase in the sale of gas by meter represented £3369. Coke had realized £4867 more than in 1906. The accounts accompanying the report showed that the total revenue in the past year was £93,580, and the expenditure £72,082; leaving a balance of £21,498. Adding the balance of £5965 brought forward, there was produced a total of £27,463. This the Directors proposed to apportion as follows: First half-year's dividend at 4 per cent. (less income-tax), £7665; interest on mortgages, &c., for the year, £4486; second half-year's dividend at 4 per cent. for the year (less income-tax), £7973; transfer to insurance fund, £500—making a total of £20,624, and leaving a balance of £6839 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, said the price of coals rose more than 26 per cent. before the yearly contracts were made last June. This caused the Directors considerable anxiety, as it was impossible to forecast what effect this sudden extra expenditure of upwards of £6000 a year would have on their dividends. The enhanced value of coke, breeze, and other residuals, together with the very large augmentation in the sale of gas, had enabled the Directors to present a favourable balance-sheet, and tided them over without a recommendation to increase the price of gas or draw upon the reserve fund to pay the statutory dividends. At the last annual meeting, it was mentioned that the Directors contemplated a renewal and re-arrangement of the Jarrow works. Nothing had been done there, however, except repairs to the old hand-stoked retorts. They found the plant of the South Shields station worked so efficiently, and was able to produce during the winter months the increased quantity of gas required without anxiety as to shortage of supply, that they deferred incurring any extra expenditure on the Jarrow works. They were, however, watching every new development in coal distillation; and eventually they hoped to have the most modern and economical plant erected at Jarrow. During the year they had completed the purchase of land at Biddick, with the intention of erecting a large gasholder, which would be absolutely necessary in a few years, as their present storage capacity was insufficient. The sale of gas during the year had been the largest on record, and the percentage of increase the greatest attained for the last ten years, which showed that the Company were holding their own in the competition with other modes of lighting. During the past twelve months the remainder of the public gas-lamps in South Shields and Jarrow had been converted from the flat-flame to the incandescent system, by arrangement with the Local Authorities concerned, after lengthy negotiations, and in competition with the electric light; so that now flat-flame burners in public lamps in the Company's district had been abolished, to the advantage of the public generally. A large number of consumers' incandescent burners were attended to by the Company; and as the scheme became better known, this branch was bound to extend. While it was essentially a consumers' scheme, it was in the interests of the Company to extend it. It was satisfactory to note that incandescent gas continued to hold the field for lighting, in point of cost and efficiency, against all comers. With regard to the accounts, last year they were able to carry forward £1900 and place £500 to the insurance fund. This year they proposed to carry forward £873, and add £500 to the fund. The receipts during the year amounted to £93,580, and the payments to £72,082; leaving a profit of £21,498. After deducting the dividend, the interest on mortgages, and the sum transferred to the insurance fund, there remained a balance of £6839, which placed the undertaking in a better financial position than it had occupied in any previous year. The markets at present were uncertain and all business matters in the North unsettled. What with the Mines (Eight Hours) Bill now before Parliament, and the threatened continuance of the heavy burden of taxation, no one could forecast what prices would rule the coal market during the second half of this year. They had, however, as he had said, £6839 to the good, which lent a certain amount of elasticity to their resources, and inspired confidence in their position. In conclusion, he acknowledged the excellent services rendered to them by the Secretary (Mr. J. H. Penney), the Engineer and Manager (Mr. T. H. Duxbury), and the staff.

The VICE-CHAIRMAN (Alderman W. R. Smith, J.P.) seconded the motion; and it was carried unanimously.

The meeting was then made special, and authority was given to the Directors to create and issue £50,000 of ordinary 5 per cent. stock, and to borrow on mortgage to the extent of one-third of the amount realized by the sale of the stock.

Reduction in Price at Altrincham.—The report for the year to Dec. 31 last, presented at the meeting of the Altrincham Gas Company, showed a profit of £10,145, or an increase of £1153 over the previous year. There was an increase of over 6 million cubic feet in the consumption of gas. It was agreed to appropriate £1500 to the suspense account for the repayment of money expended out of capital for the purchase of new plant, bringing up the total thus applied within the last five years to £7500. The full statutory dividends were declared; and it was agreed to reduce the price of gas by 2d. per 1000 cubic feet. This will affect the revenue by £1450; but as the Company will in future be relieved from further payments to the suspense account, there is ample margin for the concession to consumers.

READING GAS COMPANY.

The Annual General Meeting of this Company was held at the Offices, Friar Street, Reading, last Tuesday—Mr. J. OKEY TAYLOR, J.P., in the chair.

The SECRETARY AND ACCOUNTANT (Mr. A. Canning Williams) having read the notice of meeting, the report and accounts for the year ending Dec. 31 last were presented. The Directors stated that, in conformity with the intimation contained in the preceding report, the charges for gas were reduced, with the result that the consumers had benefited to the extent of nearly £5000. The revenue derived from the sale of gas (including the rental of prepayment consumers' cookers, fittings, &c.) for the past year amounted to £73,319, compared with £74,637 for 1906—a decrease of only £1317. In view of the reductions in the price of gas already referred to, the Directors considered this was a satisfactory feature of the accounts. It was explained by the fact that the sale of gas during the year increased by 4·09 per cent. The accounts accompanying the report showed that the revenue for the twelve months was £95,481, and the expenditure £79,180; leaving a balance of £16,301. The sum that was available for distribution was £24,945. Interim dividends of 5 per cent. per annum on the preference shares and ordinary stock, for the six months ended the 30th of June, had been paid; and the amount standing to the credit of the profit and loss account enabled the Directors to recommend the payment of dividends at the same rate for the past half year (less income-tax).

The CHAIRMAN, in moving the adoption of the report and accounts, said the first point to which he should like to call attention was what had been done during the past two years in regard to the price of gas in the town. He did not believe the consumers realized that the sum of £8000 had been presented to them during this period in the shape of reductions in charge. He considered this was a matter for which the Directors might fairly claim some credit, because the gas being so cheap must prove an important factor in the success of any town. It was true that the balance left after payment of the dividends was not so great as in previous years; but this was accounted for by the very large reductions made in the price of gas, and also by the increased cost of coal and oil—the two most essential elements in the manufacture of gas. The balance had been further diminished by the action of the Directors in carrying to depreciation a larger sum than had ever before been placed to this account. Since the penny-in-the-slot system was adopted in Reading, it had developed rapidly; and they must all recognize its value in bringing gas within the reach of every class. These installations were placed in the houses by the Company free of cost to the consumers; and the apparatus naturally deteriorated as the years went on. The Directors had therefore thought it wise to carry a larger sum to depreciation; and he thought the stockholders would agree that this was a wise course to take. There had been two other influences tending in some degree to diminish the income of the Company, successful as it had been. He alluded more particularly to the rapid growth of incandescent gas lighting by means of inverted burners, by which system the consumers were getting a far better light than they did before, at a greatly reduced cost, and with a much lower consumption of gas. Then, again, there were a large number of empty houses in the town. There were about 17,000 houses in Reading, and gas-services had been laid to about 14,000; and the Company were still adding to this number at the rate of 15 per week. There were 8000 houses containing slot installations; and of this number 425 were empty on Dec. 31 last. In other words, the gas apparatus in these houses was lying idle, and the Company were getting no return from the money expended on the installations. Had the houses been occupied, the stockholders would quite see that there would have been a much larger consumption of gas. As it was, there had been an increase of 22 million cubic feet in the consumption of gas during the past year, which, under the circumstances, they would no doubt agree was highly satisfactory. The price of gas was now 2s. 7d. per 1000 cubic feet; and no charge was made for meter-rent. As the Gaslight and Coke Company were charging 2s. 10d. *plus* meter-rent, he thought they in Reading might congratulate themselves on the fact that a provincial company could compare so favourably as regarded price with the largest London Company. He considered the fact that gas was so cheap in Reading should be kept as much as possible before the public. Their Chamber of Commerce had recently discussed the question of the best means to adopt in order to induce firms to set up their factories in the town. A point which, to his mind, had been somewhat overlooked was that coal gas could be obtained so cheaply for motive power, &c. Their Engineer (Mr. Douglas H. Helps) had informed him that Messrs. R. Cort and Son, engineers and manufacturers of stoking machinery, tools, &c., of London, had recently decided to remove their works to Reading; and he understood that the firm would use the Company's gas for driving their machinery. He thought they might claim to have held their own against all competing agents. Many business houses over the country had reinstated gas after a trial of electricity; and numerous instances of this had occurred in Reading. This fact spoke for itself. One of the greatest scientists of the day—Sir Oliver Lodge—in a recent speech remarked: "Electricity is a luxury, but is dear; gas also is now a luxury, and is cheap." The Directors had had great cause for anxiety regarding the price of coal. At the beginning of the year, soon after they had made the reduction in the price of gas—perhaps they might not have made so large a reduction if they could have foreseen what would happen—coal began to rise in price. The coal duty, which produced to the nation some 2½ millions of money, was taken off; and directly the duty was removed, the price of coal advanced at an alarming pace. This was a grave matter for gas companies. In their own case, 1s. per ton advance in the price of coal involved an extra expenditure of about £2000. Their contracts were made last year at an increase of 2s. 6d. per ton, which therefore represented an additional cost of about £5000 per annum. The Government had introduced a Bill to reduce the hours of labour in coal mines. The result of such legislation would, in the opinion of many persons qualified to judge, bring about a permanent rise in the price of coal which would not only seriously affect every householder in the kingdom, but most of the great industries, especially the railways, the iron and steel trade, and shipping. Many industries were sending deputations to the Home Secretary to protest against the Bill; and the gas companies were doing the same. It was to be hoped grave consideration would be given to a measure which was likely to bring about a permanent rise in the price of coal. Coming back to the affairs of the Company, the Chairman said he could not speak too highly of the Engineer and his management of the works. During the past year, they had obtained better results in the carbonizing department than they had ever obtained before; and he was thankful to acknowledge that this had been largely brought about by the harmonious working between the staff and the men. In the Secretary's department, also, good work had been done. In order to encourage this good feeling, the Directors had opened a club for the men on the works, and had provided them with a mess-room, reading-room, and games-room. There were cooking utensils and means for heating food in the mess-room; and the men could now take their meals in comfort. He thought that they appreciated these comforts, as so many of them had joined the club. There would be a Gas Engineering Section in connection with the Franco-British Exhibition which would be opened this summer; and the Engineer was a member of the Committee organizing the section. Such exhibitions gave gas companies an opportunity of seeing the improvements which had taken place in the manufacture of gas apparatus, &c.; and they then brought such improvements before the public by means of their show-rooms, &c.

The DEPUTY-CHAIRMAN (Mr. H. B. Blandy, J.P.) seconded the motion.

Mr. DRYLAND HASLAM said, as a shareholder, he should like to congratulate the Directors on having carried a much larger sum to depreciation—a matter to which he called attention before the previous annual meeting. He added that he thought the increased popularity of gas in the town was due, to a certain extent, to the extreme courtesy always shown to consumers by anybody connected with the Company. One had only to throw out a suggestion to Mr. Helps that the burners or gas-fires were not quite right, and the matter was immediately looked into. This had been noticed not only by himself, but by others. He thought it was a good thing that the Company should have such excellent officers, of whom any company might be proud.

The motion was carried unanimously.

The retiring Directors and Auditor having been re-elected, a vote of thanks was accorded to the staff.

Mr. HELPS, in acknowledging the vote, said the staff under him had worked loyally and intelligently in the interests of the Company during the past year, and had greatly assisted him. He added that he never felt more confidence in the gas industry than he did at the present time. The old flat-flame burner was practically extinct, and the upright incandescent burner was now being superseded by the more economical inverted burner, which gave a duty of from 25 to 30 candles per cubic foot of gas consumed. It was possible to light a fair-sized room with a consumption of about 4 cubic feet of gas per hour; in other words, it could be well and uniformly lighted for ten hours at a cost of less than 1½d. He had recently seen it stated that 80 per cent. of the railway carriages in America were lighted by means of incandescent gas-burners; and if gas could compete successfully with electricity on a fast-travelling train, it could certainly do so in the case of the lighting of houses.

Mr. CANNING WILLIAMS also acknowledged the vote on behalf of the staff under his supervision.

On the motion of Mr. DRYLAND HASLAM, jun., a vote of thanks was cordially passed to the Chairman.

The CHAIRMAN, in returning thanks, said his work as Chairman had been an interesting feature of his life; and, as long as he possessed the strength, it would always be a great pleasure to him to do what he could for the Company, with which he had been connected since 1856. He expressed his pleasure at finding that the shareholders were satisfied with the management of the undertaking.

The proceedings then closed.

GAS SUPPLY IN NORTH LONDON SUBURBS.

Forty Years' Progress at Hornsey.

The Half-Yearly Meeting of the Hornsey Gas Company, which was held on the 21st ult. at the Chief Offices, Chancery Lane, W.C., under the presidency of Mr. John Drew, was interesting in several respects. The report showed that the profits for the six months ending Dec. 31 last were £9883; and the Directors recommended the payment of dividends at the respective rates of 5, 12½, and 9½ per cent. per annum on the preference, "A," and 7 per cent. consolidated stocks. In moving the adoption of the report, the Chairman stated that the increased make of gas had been 13,297,600 cubic feet; so that they had again to congratulate themselves on a very successful half-year's business. In spite of dear coal and some adverse circumstances, the Directors were able to recommend the payment of the full dividends and carry forward £2341, which, added to the amount brought forward, raised the reserve fund to £29,041. Referring to the capital account, which has been overdrawn to the extent of £13,647, the Chairman explained that by the use of the amount in reserve they obviated the necessity of creating fresh capital. Without dwelling further upon the accounts, he assured the meeting that the undertaking was going on very satisfactorily, that the Directors were giving their undivided attention to its affairs, and that the proprietors had a most excellent property, which had every prospect of increasing in value. Before concluding his remarks, Mr. Drew asked the indulgence of the meeting while he alluded to a personal matter.

This was, he continued, the fortieth anniversary of his connection with the Company as Director and Chairman. Of the ten first Directors, of whom he was one, eight were dead and one (Sir Harry Poland) had resigned. The Company's Act received the Royal Assent on May 18, 1866; and the capital was £50,000. It was uphill work at starting; but the Directors had confidence in the future, and it had been justified by events. At the end of the first ten years (1877), the make of gas was 41,575,000 cubic feet; at the end of the second ten, it was 88,372,000 cubic feet; at the end of the third ten, 234,118,000 cubic

feet; and at the end of the fourth ten, 472,299,000 cubic feet. These figures showed very remarkable expansion, especially in the last decade, when the make was more than double that of 1897. The number of consumers in 1877 was about 1200; the number on the books at the present time, including those using slot meters (1992), was 12,152; and a separate account was open for each. In 1877, they had 13½ miles of mains laid, of which 6 miles had been replaced by larger ones. They had now 83 miles of pipes. The paid-up capital for the first year was less than £20,000. It was now £231,554, representing a capital expenditure of only £545 per million, or 10s. 11d. per 1000 cubic feet of gas made. This £545 per million showed how provident the Company had been with their capital expenditure, and compared favourably with most other gas companies. During the period under review, the whole of the old plant had been replaced by new; and, with the exception of one small gasholder, nothing remained. The works had been entirely remodelled and rebuilt from the designs and under the direction of their able Engineer (Mr. H. J. Mitchell); and no architect or contractor had been engaged—the work having been done by their own men. He would not trouble the meeting with further details; but it would be seen from what he had stated that the history of the Company had been one of continuous unbroken progression, and it had been a great pleasure for him to have been connected with its history from the first—a history of difficulties overcome as well as of successes accomplished. Perhaps he might be allowed to say it was also a cause of thankfulness that his life and health had been spared, and that his faculties remained unimpaired in his 84th year. His faith in the Company was stronger to-day than it was forty years ago; and as long as he could do so consistently with the interests of the Company, and as long as he felt he had the shareholders' continued confidence, he would endeavour to serve them in the future as he had tried to do in the past.

Mr. John Miles seconded the motion; and it was carried unanimously. The dividends recommended having been declared, Sir Hugh Owen moved the re-election of Mr. John Drew as a Director of the Company. In doing so, he remarked that the proprietors desired to place on record their recognition and high appreciation of the invaluable services rendered by Mr. Drew during the forty years he had served the Company as a Director, and during the many years he had been the Chairman of the Board; and they earnestly hoped that he might long have that measure of health which would enable him to continue in the office he so worthily filled. Mr. Kenneth Mackay seconded the motion; and it was unanimously agreed to. Mr. John Miles was also re-elected a Director. Hearty votes of thanks were passed to the Chairman and Directors, the Engineer and Manager, the Secretary (Mr. W. E. Roberts), and the other officers and the staff; and the proceedings closed.

Progress at Mill Hill and New Southgate.

The Directors of the North Middlesex Gas Company presented an excellent report at the half-yearly meeting last Wednesday. Compared with the corresponding period of 1906, the sale of gas in the six months ending Dec. 31 last had increased by 7,690,700 cubic feet, or 9·6 per cent. The total quantity of gas sold was 87,267,300 cubic feet, and it produced £15,918; the rental of meters, fittings, and stoves brought in £1363; the sale of residuals, £1818; and the total revenue was £19,154. Expenditure on the manufacture of gas was £9548; on distribution, £2710; on management, £1056—the total expenses being £14,567. The balance carried to the net revenue account was £4587; and the amount available for distribution was £6514. Out of this sum, dividends at the rates of 5, 10, and 7 per cent. per annum were declared, £473 was added to the reserve fund, and there was left a balance of £2932 to be carried forward.

An equally good record was presented by the Directors of the Southgate and District Gas Company at their recent half-yearly meeting. In the six months ending Dec. 31, the sales of gas increased by 8,537,100 cubic feet, or 14·14 per cent., over those in the second half of 1906. The quantity of gas sold was smaller than in the case of the neighbouring Company just referred to—being 68,884,300 cubic feet, the revenue from which was £12,597; the rental of meters, stoves, and fittings produced £780; the sale of residuals, £1688; and the total receipts came to £15,322. The expenditure on the manufacture of gas was £7436; on distribution, £2177; on management, £909; and the total expenses amounted to £11,630—leaving £3692. The balance available for distribution was £4855; and dividends were declared at the rates of 5, 10, and 7 per cent. per annum on the preference, original, and additional capital. The payment of these required £2562; and there remained a balance of £2293 to be carried forward.

Thefts by Children from Prepayment Meters—On the consideration last Tuesday of a report by the Education Committee of the London County Council, suggesting that evening play centres should be provided for public elementary school children, Mr. Allen, M.P., said he thought they were very necessary to keep children off the streets in the evening. Cases had come to his knowledge where children had broken open penny-in-the-slot gas-meters in order to get money to go to the cheap music halls in East and South London.

Street Lighting for Cobham.—At a public meeting of the parochial electors of Cobham, it has been decided to adopt the Lighting and Watching Act, so that a system of public lighting may be carried out. The mover of the resolution proposed that the Overseers should make a rate of 1d. in the pound on the rateable value of the parish as assessed for the purposes of the adoptive Acts. He said this was not a large amount to pay individually, especially in view of the benefits that would accrue. At the present time, with the assistance of the Gas Company and the Welsbach Incandescent Gaslight Company, he had been able to place seven lamps in different parts of the village, so that they could all appreciate their value. The meeting would not have to decide on the form of lighting; the Parish Council would do that. The question was whether the people of Cobham should be a little up-to-date, and have their village lighted at nights. The suggested 1d. rate would produce roughly £100, which he thought would be sufficient to provide about 30 lamps.

PROVINCIAL GAS COMPANIES.

Small Increase at Brighton.

According to the report presented at the half-yearly general meeting of the Brighton and Hove Gas Company last Friday, there was only a small increase in the quantity of gas sold in the six months ending Dec. 31 last as compared with the corresponding period of 1906; but the revenue from the residual products showed a substantial improvement. The total quantity of gas sold was 590½ million cubic feet; and it produced a revenue of £84,534; the rental of meters, stoves, and fittings yielded £8842; the sale of residuals, £19,048; and the total revenue was £112,528. The expenditure on the manufacture of gas was £59,677 (coal, coke, oil, &c., costing £43,838); on distribution, £18,735; and on management, £4755. The balance carried to the profit and loss account was £23,084; and the amount available for distribution was £34,516. Out of this sum, the Directors recommended the payment of dividends at the rates of 6, 4, 11¼, and 8½ per cent. per annum on the two preference, the original, and the ordinary consolidated stocks, amounting to £24,235, and leaving £10,281 to be carried forward.

Improved Working at Chichester.

The report presented at the half-yearly meeting of the City of Chichester Gas Company last week stated that the balance standing to the credit of the profit and loss account, net revenue, amounted to £2278, out of which the Directors recommended a dividend, for the half year ended Dec. 31, at the rate of 10 per cent. per annum upon the "A" capital stock, and 7 per cent. per annum upon the "B" and "C" capital stocks—all less income-tax. In consequence of the continued high price of coals and other materials, the Directors had considered it necessary to increase the price of gas 2d. per 1000 cubic feet, as from the date of taking the indices of the meters at Christmas last. This increase would continue for a period of six months, when the Directors hoped the condition of the coal and other markets would be such as to enable them to revert to the price of 3s. 3d. per 1000 feet. In moving the adoption of the report, Mr. Alfred Lass, the Chairman, said that the capital employed on Dec. 31, 1907 (£48,985) was at the rate of 16s. 7·32d. per 1000 cubic feet of gas sold; and as the works and plant had been recently reconstructed, and were practically new and capable of producing about 24 per cent. more gas than the maximum daily make in 1907, he thought they would agree that the capital had been wisely and judiciously expended, and that the position of the Company in this respect was satisfactory. The quantity of gas made during the half year ended Dec. 31, 1906, was 32,446,000 cubic feet, or 10,866 feet per ton of coal carbonized; the quantity made during the half year ended Dec. 31, 1907, was 34,234,000 cubic feet, or 12,037 feet per ton. This was an increase of 1,788,000 cubic feet, or 1171 feet per ton. The quantity of gas sold during the half year ended Dec. 31, 1906, was 29,552,000 cubic feet, or 9897 feet per ton of coal carbonized; the quantity sold during the half year ended Dec. 31, 1907, was 31,017,000 cubic feet, or 10,906 feet per ton. This was an increase of 1,465,000 cubic feet, or 1009 feet per ton, or 4·95 per cent. With 142 tons of coal less carbonized, there had been produced 1,788,000 cubic feet more gas than during the corresponding period of 1906. The cost of coal during the past half year was 22s. 1·42d. per ton, or an increase of 3s. 8·89d. per ton. This heavy rise had, however, been counterbalanced by an increase in the sale of gas to the extent of 1,465,000 cubic feet. During the last ten years the sale of gas had increased from 36,921,000 cubic feet to 58,984,000 feet, or at the rate of 4¾ per cent. per annum compound. If this rate of increase was maintained, the sale of gas would be doubled in about fifteen years. On Dec. 31, 1906, the number of consumers was 1639; on Dec. 31, 1907, it was 1775, or an increase of 136. In the meantime, the number of cooking and heating stoves on hire had increased from 548 to 885. The report was adopted; and the dividends recommended were declared. In seconding a vote of thanks to the Engineer (Mr. T. E. Pye), Secretary (Mr. V. V. Vick), and staff, Mr. J. Cash remarked that, in addition to the record of gas manufactured per ton of coal (12,037 cubic feet), credit must be given for the fact that, notwithstanding the increased price of coal, the cost of the gas in the holders had decreased; the figure being 18·83d. per 1000 cubic feet this half year, as compared with 20·5d. in the corresponding period twelve months ago. It all testified to the good work done under Mr. Pye's management. Mr. Pye, in response, said the staff had been greatly stimulated by the kindly encouragement of the Directors. He testified to the excellent tone prevailing among the employees, which he attributed in a large measure to the provision of facilities for recreation and social intercourse. These, it may be mentioned, include a weekly musical entertainment throughout the winter season, fully supported by all the employees and their wives, children, and friends, football and cricket clubs, a women's sewing and thrift club (conducted by Mrs. Pye), and savings clubs for both the men and the women.

A Satisfactory State of Affairs at Eastbourne.

The report which was submitted at the recent half-yearly meeting of the Eastbourne Gas Company stated that the revenue account for the six months to Dec. 31 showed a profit of £8157. There was a balance of £23,411 at the credit of the profit and loss account, after payment of the half-yearly dividend, in June last, and other charges. The Directors recommended that a dividend for the past half year be declared at the rate of 15 per cent. per annum upon the £20,000 original capital of the Company, and also upon the £12,500 capital raised on "C" shares, and at the rate of 12 per cent. per annum upon the £94,000 capital raised on "B" shares (this to include three months' dividend upon the £4000 additional capital received during the half year). This would absorb the sum of £7957, and leave a balance of £15,454 to be carried forward to the next account. Three new purifiers had been erected during the half year, in place of four smaller ones, and were now at work satisfactorily. Other improvements were being made in the plant at the works to meet the steadily increasing demand for gas. The Chairman (Dr. G. A. Jeffery), in moving the adoption of the report and accounts, said that the sale of gas had increased from 207,336,000 cubic feet in the corresponding half of 1906 to 217,722,000

feet in the past half year. This was an increase of 10,391,000 cubic feet, or 5 per cent., which was very satisfactory considering the mild weather. The present number of consumers was 4428 ordinary and 4136 coin-meter; being a total of 8564, or a gain during the year of 382. There was a net profit of £8175, which was £200 over the dividend, and was arrived at after every provision had been made for the adequate upkeep of the works and mains. Residuals had realized £7580, as against £6234, which was a gain of £1346. As a rule, when coal was dear residuals were more productive; and this recouped them to a certain extent for any increased outlay on coal. Naturally the past half year had not been an ideal one for gas companies. The weather had been very mild, especially in December. All gas companies had suffered more or less from this cause; but there was a more serious cause still—namely, the enormously high price of coals. This had been a severe pinch to many companies—so much so that it had frequently necessitated raising the price of gas. "We," continued the Chairman, "so far, have not suffered much. Your Directors, by their forethought, entered into a contract for coal for three years at a cheap rate. That is now nearly exhausted. The pinch is to come. How is it to be met? Well, we have had contingencies before, and we have met them successfully. Why should we not meet them now? We shall endeavour to meet them in a straightforward, business way, and with as wise a Consulting Engineer as Mr. H. E. Jones, with as prudent a Manager as Mr. John Hammond, with an indefatigable and painstaking Secretary such as Mr. J. S. Garrard, with a very efficient staff at the office and at the works, and with, I may say, the whole-hearted service of our employees, we have, if I may call it so, a bond of union which has an immense deal of strength; and I think you need not fear for the future of your dividends. We shall not raise the price of gas; and I think we shall make you realize that the shares in the Company are one of the best of gilt-edged securities." The report was adopted, the dividends agreed to, and the meeting closed with votes of thanks to the Chairman, Directors, officers, and workmen.

Extended Area and Reduced Price at Exeter.

In the report presented at the annual meeting of the Exeter Gas Company on Monday last week, the Directors stated that the sale of gas had increased in the twelve months ending Dec. 31 last by nearly 7 million cubic feet, while the income from residual products had considerably advanced. The accounts accompanying the report showed that the income for the year was £59,989, against £58,356 in 1906. The net profit was £11,101, compared with £11,804 in the preceding year; but during the past twelve months the sum spent on slot fittings and the repair and renewal of stoves was £4580 against £1680 before. The amount received for private lighting was £38,511, against £36,924; but in consequence of the City Council having taken over a greater number of the lamps, the income from public lighting was only £3196, against £4820 in the previous twelve months. The Directors recommended dividends of 10 and 7 per cent. on the original and ordinary stock, free of income-tax, which would absorb £6325 of the amount available for distribution. The Chairman (Mr. G. H. Harris), in moving the adoption of the report, referred to the satisfactory increase in the consumption of gas. He expressed regret at the high price of coal, but pointed out that this had led to a rise in the selling price of coke, and so had increased the value of the residual products. Though, in consequence of the Council increasing the area of the lighting of the city by electricity, there had been a decrease in the Company's receipts for the lighting of the public lamps, still, so far as the existing contract was concerned, it was working satisfactorily. The Chairman drew attention to the fact that during the year the Company had laid on the gas to Alphington and Ide—a convenience which was appreciated by the people in those districts. Since the preparation of the report, the Directors had decided to reduce the price of gas to the public by 2d. per 1000 cubic feet. There were three sources of consumption for gas—lighting, heating, and power; and the Directors intended to do their utmost to maintain a high standard in each direction. The report was unanimously adopted, and the dividends recommended were declared. In the course of the report, reference was made to the death of Mr. R. T. Campion, who was a Director of the Company for seventeen years, and for six years occupied the chair. Before the meeting closed, a suggestion was made by Mr. J. Stocker that, in view of the long period during which the Secretary (Mr. W. A. Padfield) had been connected with the Company, and the excellent service that he had rendered, he should be elected a member of the Board in place of the late Mr. Campion. This suggestion met with the approval of the shareholders; and the Chairman promised that it should receive the careful consideration of the Directors.

Continued Prosperity at Longwood.

Mr. Robert Thornton, the Chairman of the Longwood Gas Company, in moving the adoption of the report and accounts at the annual meeting, said they indicated that, notwithstanding the competition which, in some instances, might be regarded as somewhat severe, the prosperity of the undertaking continued. The trade of the district flourished, and the Company had partaken of its prosperity. The quantity of gas sold during the twelve months had been 100,152,800 cubic feet, an increase of a little over 1 per cent. This must be regarded as very satisfactory, especially considering that the improved methods of incandescent gas lighting had brought about a big reduction in the consumption of gas per consumer. The make per ton of coal was slightly less, and was due to a combination of adverse circumstances. In conjunction with the chairmen of other undertakings, he deplored the taking off of the 1s. export duty on coal. The leakage of gas was at the rate of 7·52 per cent., which was an increase of a little over ½ per cent. A satisfactory feature of the sales of gas was that the mills, notwithstanding that several had adopted high-pressure gas lighting, and thereby reduced the consumption, still used as much gas as ever. The quantity sold for factory lighting during the past year amounted to no less than 20,526,000 cubic feet. Gas used for power was also on the increase; and the slot-meter was as popular as ever. During the past year, the Company had sold for public lighting 4,792,000 cubic feet of gas, or 4·79 per cent. It was interesting to look back ten years, and notice that in 1897 the quantity of gas sold for public lighting was 4,370,000 cubic feet, or 9·99 per cent. Though the consumption had increased less than 10 per cent., the number of lamps had increased from 356 to 431, the lighting hours had been extended, and by the adoption of incandescent burners, at least four times the illumination per lamp was obtained. During the past few months, the last flat-flame lamps had disappeared; the Linthwaite Council having extended incandescent gas lighting throughout the whole of the area supplied by the Company. The highest output of gas in one day had been 567,000 cubic feet. In concluding his remarks, he expressed his confidence in the continued prosperity of the undertaking. The report and accounts were adopted; and a dividend at the rate of 3 per cent. on the consolidated ordinary stock was declared, which, with the interim dividend, makes a dividend of 5 per cent. for the year.

An Eight per Cent. Increase at Tonbridge.

The report which was submitted at the annual general meeting of the Tonbridge Gas Company on Monday of last week stated that the revenue account showed a profit of £3979. After allowing for payment of interest on debenture stock and the interim dividend, the profit and loss account exhibited a balance of £6087, from which the Directors recommended dividends at the rates of 12½, 9½, and 5 per cent. per annum on the several stocks, leaving a balance of £4357 to be carried to the next account. These figures, considering the recent reduction in the price of gas from 2s. 10d. to 2s. 8d. per 1000 cubic feet and the greatly increased cost of coal, the Board thought the shareholders would consider highly satisfactory. The consumption of gas showed an increase of 7 million cubic feet, or about 8 per cent. The Chairman (Mr. John Fagg) said it was a great pleasure to the Directors to be able to submit such a satisfactory balance-sheet. When they decided in December, 1906, to reduce the price of gas, they did not anticipate such a great increase in the cost of coal; but results had proved that they had done the right thing in making the reduction. The past year had been the most satisfactory in the history of the Company; and the increase reported was the largest for several years. Notwithstanding the reduction in price, the income had increased by £1100. The report was adopted. A hearty vote of thanks was accorded to the Chairman and Directors, and also to the Secretary and Engineer (Mr. James Donaldson), who in reply gave a few figures relative to the progress of the Company during the past twelve years. In 1895, the quantity of gas manufactured was 37 million cubic feet; whereas last year it was nearly 100 millions. The price of gas had been reduced 10d. per 1000 cubic feet, which meant a saving to the consumers of £4800 per annum; and the dividends had increased by 2½ per cent. The price of one class of stock—viz., the "D" stock—was £140 per £100 in 1895; while some was sold lately at £216 per £100. The other stocks had risen proportionately. During the same period 1700 prepayment meters had been fixed, about 2300 gas-cookers, 300 to 400 gas-fires, and many other gas appliances.

Steady Growth of Business at Weymouth.

At the recent half-yearly meeting of the Weymouth Consumers' Gas Company, the Directors reported the continued steady growth of the Company's business. The quantity of gas sold in the six months ending Dec. 31 was 59 843,300 cubic feet—an increase of 1,454,500 cubic feet, or 2·49 per cent., on the second half of 1906; the total sale for the year 1907 being 109,874,900 cubic feet, which was an advance on the year 1906 of 3,930,800 cubic feet (3·7 per cent.). There was a decrease in the amount of the gas rental for the half year; but this was explained by the reduced price of gas, of which the consumers had experienced the benefit. The result of the half-year's working enabled the Directors, after paying interest on the debenture stock, to recommend the declaration of a dividend on the ordinary stock at the maximum rate of 5 per cent. per annum (less income-tax) for the six months. The Chairman (Mr. J. E. Robens), in moving the adoption of the report, alluded to the increased sale of gas, which he thought was a highly satisfactory feature of the past year's working. Referring to the condition of the coal market, he said the Company had been placed in favourable circumstances compared with many companies. Before the rise in price took place, the Directors had a prevision that there was about to be a change; and as they found they could not get from their own Contractor a satisfactory arrangement, they began to obtain quotations elsewhere. Several samples were procured and tested by their Engineer and Manager (Mr. D. F. Colson), who reported on one as being satisfactory. He thought it would be best for them to immediately enter into a contract. They did so; and they were very glad they attended to his advice, for it had carried them on successfully, and had enabled them to save at least £1100 which they would otherwise have had to pay for coals under their original contract. Turning to the accounts, he said they had received from the sale of gas last year £17,077, and from residuals £4725. Meter rents and stoves had brought them in £1498; and the gross income from all sources was £23,457. There was, however, a diminution of £280, owing to the reduction in the price of gas. The proprietors must take the fact into consideration that the Company had lowered the price twice consecutively during two years, which meant a loss last year of £906, and the previous year of about £880. This was more than £1700 which they had sacrificed within two years. But they had brought their affairs so close together that they were able to pay the full dividend, and had only had to take £80 from the net revenue account; thus leaving the reserve fund untouched. They found themselves in this position after all the difficulties they had had to face in regard to the coal market. There was one item in the accounts which he thought deserved serious consideration, and that was the rates which had been imposed upon them by the re-assessment of the borough. Their rates had gone up 87 per cent. They began on the Weymouth side and Wyke followed; but the Directors were determined that the whole of the concern should be assessed, and they had placed the matter in the hands of Mr. Valon, upon whom they could fully rely. In conclusion, he said the Directors had every confidence in the stability of the Company. Mr. J. G. Rowe seconded the motion; and it was carried unanimously. The retiring Directors and Auditor having been re-elected, a vote of thanks was accorded to the Chairman and Directors. In acknowledging it, the Chairman referred to the services of the Engineer and the Secretary (Mr. E. Y. Wood), and those associated with them. They were, he said, the real foundation of the success of the Company. He was very pleased to say that in their present Manager they had an able

successor to a very good Manager (Mr. James Lowe), who worthily filled the position in which he was placed; and they had derived great advantages since he had occupied it. He proposed that the best thanks of the meeting be given to the Manager, Secretary, and officers of the Company. The proposition was heartily carried, and briefly acknowledged by Mr. Colson and Mr. Wood.

ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

Progress of the Electric Light Department.

The Ordinary General Meeting of this Company was held last Tuesday, at the Offices, No. 50, Cannon Street, E.C.—Mr. JOSEPH MANWARING in the chair.

The SECRETARY (Mr. W. A. Schultz, F.C.A.) read the notice convening the meeting and the minutes of the previous meeting; and the report and accounts were taken as read. These showed, for the half year ended Dec. 31, a profit on the gas account of £2225 8s. 5d., and a small loss of £14 12s. 4d. on the electricity account. After providing for every charge against the half-year's working and interest on the mortgage debenture stock, there remained a balance of £2711 18s. 10d. at the credit of the profit and loss account.

The CHAIRMAN said the result of the working had been satisfactory. It would be noticed from the revenue account that the receipts for gas had increased in the half year ending Dec. 31 last, as compared with the same six months of the previous year, by £337, with a corresponding rise in the meter and stove rentals. The quantity of gas sold during the half year was 22,363,800 cubic feet, as against 20,633,000 feet—an increase of 1,730,800 feet, or 8·4 per cent. The high price of coal had affected the Company, in common with all other gas undertakings. When the last contracts were made, the Directors had seriously to consider the desirability of increasing the price of gas; but—as they did in the case of the last rise in the coal market—they decided to leave the price as it stood. On the other hand, however, the yield from coke had been much better—£956, as compared with £691 in the same period of 1906. The average price realized for coke was 8s. 3d. per ton in 1906, and 10s. 5d. per ton in 1907. In the former year, the coke used in manufacture amounted to 27·8 per cent. of the quantity produced; while last year it was 25·2 per cent. The unaccounted-for gas in the six months ending December, 1906, was 5·4 per cent.; whereas in the past half year it amounted to only 4·2 per cent. of the quantity sent out, and the gas sold was 10,603 cubic feet per ton of coal carbonized. The result was that the revenue account showed an increase of £508, while there was a rise in the expenditure of £523. There was left a net profit of £2225, and a balance at the credit of the profit and loss account of £2712. This enabled the Directors to recommend that the sum of £183 further be set aside as a reserve for renewal of plant—this being the amount allowed by the Inland Revenue Authorities as a reduction from the assessment of income-tax. The number of consumers at the end of 1906 was 1197, whereas there were now 1262. The Company had the distinction of being the first gas company to exercise the powers conferred upon it to supply electricity; and he was pleased to say that the erection of the works had been completed, and the laying of the mains and services almost finished, under the superintendence of Messrs. Handcock and Dykes, the Electrical Engineers. The Directors were well satisfied with the manner in which the contracts had been carried out; and they felt that the Company now had well-equipped electric plant, which was capable of supplying the needs of that portion of the district in which the mains had been laid. The customers at first were somewhat slow in coming forward with their applications for a supply, but at the time of the drafting of the report, 2184 8-candle power lamps had been connected up. Some orders were still in hand; and other applications had been received for a supply. Until the end of last year, very little current had been sent out; but as the consumers came on the amount was naturally increased, and the Directors were very hopeful that their action in starting the electricity undertaking would very soon be amply justified. To meet the capital outlay, a sale of shares was held at Ascot last November. The state of the Money Market in the past half year had, however, been much against the issue of capital of any description; and so far only £6450 had been received—viz., £4880 in respect of shares, and £1570 in respect of loan capital. He concluded by moving the adoption of the report and accounts.

Mr. ALFRED KITT seconded the motion. Referring to the Chairman's statement that the number of electric lamps connected up at Christmas was 2184, he remarked that this had since been increased to 3000. Therefore they were pushing on; and he felt certain that the next balance-sheet, instead of showing a deficiency of £14 on electric lighting account, would exhibit a clear profit. The applications they had had for the electric light had not been with a view to substituting it for gas; they had been in respect of new houses altogether. This was a satisfactory feature. Then there was another thing. Their electrical plant had all the modern improvements; and this would place them in a favourable position.

Mr. SAMUEL SPENCER thought the balance-sheet was extremely satisfactory—especially the portions relating to the electricity department. Considering the short time it had been working, a loss of only £14 was very good; and he felt confident that now they had the works in operation for the supply of electricity, it would be largely adopted, and would be a great help to the profits of the Company.

The resolution was then carried unanimously.

On the proposition of Mr. SPENCER, seconded by Mr. F. R. SMITH, it was resolved that a dividend at the rate of 5½ per cent. per annum for the half year, less income-tax, be paid; that the sum of £183 be set aside as a reserve for renewal of plant; and that the balance to the credit of the profit and loss account be carried forward.

The retiring Directors (Mr. Manwaring and Mr. Kitt) were subsequently re-elected; and it was agreed that all Directors' fees and officers' salaries should be paid free of income-tax.

The SECRETARY read a letter from the Board of Trade stating that they had appointed Messrs. Welton, Jones, and Co., to audit the accounts for the half year ended Dec. 31 of so much of the undertaking authorized under the Act of 1906 as related to electricity. This, he explained, was an appointment apart from the selection of Auditors by the Company; but the Board of Trade had now adopted the plan of accepting a company's professional Auditors for the purpose. They required the persons named to make an audit and report to them—a special report to the Board of Trade. The Company had to pay the cost.

It was then decided that Mr. T. A. Welton, F.C.A., and Dr. H. J. Strong be re-appointed Auditors for the Company (the fees to be twenty guineas and fifteen guineas respectively), and that Messrs. Welton, Jones, and Co., should receive a fee of four guineas for auditing the electric lighting accounts for the Board of Trade.

Mr. F. G. PILLEY proposed, and Dr. STRONG seconded, a vote of thanks to the Chairman, Directors, Secretary, Engineer, and staff.

This was heartily accorded; and the proceedings concluded with brief acknowledgments by the CHAIRMAN, the SECRETARY, and the ENGINEER (Mr. A. E. Brooks).

BARNET DISTRICT GAS AND WATER COMPANY.

Establishment of a Contingency Fund.

The Half-Yearly Meeting of this Company was held on Friday, at the Holborn Restaurant—Mr. ALFRED H. BAYNES in the chair.

The SECRETARY (Mr. E. W. Drew, F.C.A.) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said it was not his intention to weary the shareholders with any lengthened remarks, but would allude briefly to some of the results of the working during the past half year. First of all referring to the gas department, the amount of gas made was 73,220,000 cubic feet, an increase of 6,393,000 feet; and the quantity sold was 67,123,000 feet, which was an increase of 5,859,000 feet, or 9⅜ per cent., as against an increase of 5½ per cent. in the corresponding period of the previous year. The coal carbonized was 6760 tons, or 614 tons more; and the average make of gas per ton of coal was 10,831 cubic feet. The average cost of coal was 1s. per ton more than in 1906; the cost having been 17s. 9d. per ton, as compared with 16s. 9d. The quantity of gas sold per ton of coal was 9929 cubic feet. Of coke there had been made 6438 chaldrons, which was an increase of 585 chaldrons; while the quantity sold was 4642 chaldrons, or 424 chaldrons more. The average price of coke sold was 7d. per chaldron more than in the previous year—10s. 1d., as against 9s. 6d. For sulphate the average price per ton realized was 5s. 2d. less, it having been £7 5s. 6d., against £7 10s. 8d. The gas-rental for the half year, compared with the corresponding six months of 1906, exhibited an increase of £1132—£12,387, against £11,255. Residuals produced £3303, which was £328 more; while the rental of meters and stoves had gone up £117. The total half-year's receipts in the gas department came to £16,708, as against £15,133, or an increase of £1675. This increase, it should be mentioned, had been more than exhausted by a rise in expenditure of some £2304; the total expenditure having been £13,130, compared with £10,826. The explanation of this increase of expenditure was to be found entirely under three heads—namely, the reconstruction of the retort-settings, £1148; the increase of 1s. per ton in the price of coal and the extra cost of the 614 tons more carbonized; and small increases in cost of working under other heads, £296—making up the exact total of £2304, which was the amount of the increased expenditure. With reference to the reconstruction of the retort-settings, it might be stated that with the old settings satisfactory results were obtained as regarded the production of gas; but the consumption of fuel was not in accordance with modern retort-settings, and the Directors unanimously resolved to reconstruct the whole of them with regenerative furnaces arranged for mechanical stoking, at the same time increasing the carbonizing capacity of the works. The cost of the retorts removed would be charged to revenue, which accounted for the increase during the half year in the expenditure. This alteration would, however, unquestionably prove economical in the saving of fuel, and in the increased durability of the retorts. Turning to the water department, he might point out that the receipts for water during the past half year exhibited an increase of £487 as compared with 1906, while the expenditure was £134 less; so that the net profit was £621 more—the actual figures being £8480 in 1906, and £9101 in 1907. The length of gas-mains was increased during the six months by 2317 yards, and of water-mains by 2769 yards, making a total increase of 5086 yards. The quantity of water pumped into the district in the past half year was 298,487,000 gallons, showing an increase over the corresponding period of 15,137,000 gallons. There were 311 new services laid for water, 166 for gas, and 56 for public lamps; the total number of new services being 533. The summary of the profit and loss account of the whole undertaking for the half year was as follows: Profit on gas, water, and fittings, £12,850, less interest and income-tax £2184, leaving £10,666. The amount required for the dividend recommended in the report was £9434, and £1000 had been carried to the contingency account, making together £10,434, and carrying forward £232 to the undivided balance of profit. It was satisfactory to report that during the past half year there had been an abundant supply of water at East Barnet; while the deepening of the New Barnet wells, and the driving of fresh adits, had produced good results. It would be seen from the accounts that the Directors had, in pursuance of the Companies Clauses Act, established a contingency fund, and had advised transferring to it the sum of £10,000 from the balance standing to the credit of the profit and loss account; and they further proposed adding every half year to this fund, as circumstances might permit. In the judgment of the Board, the fund was rendered necessary, especially in connection with the water undertaking, because the Company were continually having to sink their wells to recover the water which was lost in consequence of the gradual fall in the district, and it was considered right that such expenditure should be borne by revenue. It must also be remembered that the attempts the Company had made in Parliament to secure authority to go

outside their limits to obtain a supply of water had not been successful. The Company were consequently obliged to exploit their own district for additional supplies. When such new supplies had been sought, it had always been under the advice of the most able experts—engineers and geologists; but the results had not invariably been such as might have been expected, and it was considered that any failure the Company might have in work of this kind should be charged against a contingency fund, and not be made a capital expenditure. It was further to be remembered that the Company possessed no reserve fund, except the undivided balance of profit, from which any exceptional or special expenditure could be met. In taking the course they had done, and recommending the shareholders to sanction it, the Directors believed that they were safeguarding the best interests of the proprietors; and in saying this, he might perhaps be allowed to remind them that the members of the Board were the largest shareholders in the Company.

Dr. J. W. L. GLAISHER seconded the motion.

Mr. C. P. CROOKENDEN congratulated the Directors on the reconstruction of the retort-settings, and was glad to hear there would be a reduction in the fuel account. It had always struck him that the amount of fuel used on the works was very high. He would like a little information about the mechanical stoking. Some of these arrangements, he believed, had not been very successful; but no doubt there had been improvements made in that direction.

The CHAIRMAN remarked that they had not yet started mechanical stoking. They were only proposing to do so.

The resolution was then carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED LASS, dividends were declared for the half year at the rates of 7½ per cent. per annum on the "A" and "C" stocks, 6½ per cent. on the "B" stock, and 5½ per cent. on the "D" capital gas and water stocks—all less income-tax.

The CHAIRMAN next proposed that £10,000 be transferred from the profit and loss account to the credit of the contingency fund.

Mr. A. F. PHILLIPS, in seconding, said he thought the remarks the Chairman had already made rendered it quite clear why the necessity for such a fund existed. It would enable the Company to charge any special expenditure to the fund, instead of an excessive expenditure in any half year to the capital account.

The resolution was agreed to; and the retiring Directors (Messrs. J. L. Chapman and Frederick Lennard) and the retiring Auditor (Mr. B. Dennett Holroyd) were re-elected.

Mr. JAMES RANDALL proposed a hearty vote of thanks to the Directors, officers, staff, and workmen. He remarked that the reconstruction scheme was one of the best things the Company had done for a long time; and there would certainly be better results from working.

Mr. A. W. OKE, in seconding, said that the Directors had acted with great courage in buying coal at an advance of 1s. per ton when other companies were hesitating; and by doing so they were able to tell the proprietors that, while other companies were paying 2s. and 3s. per ton increase, the Barnet Company had only had to pay 1s. more.

The resolution having been carried,

The CHAIRMAN briefly acknowledged the compliment. He had heard only that morning that the Engineer (Mr. T. H. Martin) was very unwell, and, therefore, unfortunately unable to be at the meeting.

FATAL GAS-WORKS EXPLOSION AT BIRMINGHAM.

The Windsor Street Gas-Works of the Birmingham Corporation were last Sunday afternoon the scene of a shocking explosion, by which two workmen were killed and one was injured.

It is stated that shortly before half-past two, three labourers were engaged in the exhauster-house carrying out alterations to a main. An excavation had been made; and it was while two of the men were in the trench that the explosion occurred. The men were partially buried, and the exhauster-house was speedily ablaze. The third man was standing some distance away from the excavation, and escaped serious injury. The attention of the staff was at once concentrated on the exhauster-house, where the flames were rapidly gaining ground. An alarm was given to the Aston and Birmingham Fire Brigades, detachments from which were soon on the scene. Pending their arrival, gallant efforts were made to rescue the two men in the trench. It was impossible, however, to do anything for them, as the would-be rescuers were beaten back by the flames and the dense volumes of smoke. On the arrival of the brigades, several men made their way into the trench, protected by smoke helmets; and they eventually succeeded in discovering and extricating the bodies, which were charred to such an extent as to be almost unrecognizable. The fire in the exhauster-house gave considerable trouble to the firemen, and was not subdued until the roof had been practically burnt away, and other serious damage done to the building.

Right to Support for a Reservoir.—After a long and expensive litigation, the House of Lords have decided in favour of the Manchester Corporation in the action brought by them against the New Moss Colliery Company for working minerals in such a manner as to cause subsidence to the Audenshaw reservoir. The case was originally heard by Mr. Justice Farwell, whose decision, as recorded in the "JOURNAL" at the time, was against the Corporation. In the Court of Appeal, the judgment was unanimously reversed. A few weeks ago the arguments of Counsel were heard in the House of Lords; and last Friday the Colliery Company's appeal was dismissed.

Financial Position of the Wolstanton Gas-Works.—At a meeting of the Wolstanton Urban District Council last Tuesday, Mr. J. H. Woolliscroft, the Chairman of the Gas Committee, made a statement as to the financial position of the Council with regard to their new gas-works, and the capital outlay which had been involved. He said the cost of promoting the Bill in Parliament, owing to the opposition being so great, was £2845; and as the sum had to be paid off in five years according to the Act, it entailed an annual charge of £650 for that period. Including this sum and other heavy legal expenses, the total cost of taking over the lighting of the district had practically amounted to £50,000. This he regarded as an extremely low figure, more especially considering that their works were up to date, and capable of manufacturing and distributing 70 million cubic feet of gas per annum. The annual payment for principal and interest would entail a charge on gas of 1s. 4d. per 1000 cubic feet.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 538.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
268,324	10	,,	7½	Do. 7 p.c.	14—15	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
200,000	5	Oct. 30	7	Bombay, Ltd.	6¼—6¾	..	5 3 8
40,000	5	,,	7	Do. New, £4 paid	4½—5	..	5 12 0
50,000	10	Feb. 27	14	Bourne- 10 p.c.	27—28*	..	5 0 0
51,810	10	,,	7	mouth Gas B 7 p.c.	16¼—16¾*	..	4 3 7
53,200	10	,,	6	and Water Pref. 6 p.c.	14—15*	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	242—247*	+1½	5 1 3
300,000	,,	,,	9½	Do. New	180—185*	−½	5 2 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—123*	+½	4 1 4
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	202—210	..	5 7 1
246,320	,,	,,	8½	Do. A. Ord. Stk.	155—160	..	5 3 2
460,000	20	,,	10	British	43—44	+½	4 10 11
104,000	Stk.	Feb. 13	6	Bromley, Ord. 5 p.c.	116—119	..	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	86—89	..	5 1 2
500,000	10	Oct. 11	7	Buenos Ayres (New) Ltd.	11½—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 12	7½	Cagliari, Ltd.	26—27	..	5 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	4—6	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9
157,150	Stk.	Feb. 27	5	Chester 5 p.c. Ord.	105½—107½*	..	4 13 0
1,493,280	Stk.	,, 29	5⅛	Commercial 4 p.c Stk.	105—110	..	4 14 6
500,000	,,	,,	5	Do. 3½ p.c. do.	101—106	..	4 14 4
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	,,	6½	Continental Union, Ltd.	115—120	..	5 8 4
200,000	,,	,,	7	Do. 7 p c. Pref.	140—145	+3	4 16 7
460,170	Stk.	—	5½	Derby Con. Stk.	122—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	—	—	East Hull 5 p.c. Ord.	100—103	−1	—
486,090	10	Jan. 30	12	European, Ltd.	23—24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	16¾—17¾	..	5 2 10
15,181,590	Stk.	Feb. 13	4⅛	Gas- 4 p.c. Ord.	96—97	−1	4 10 10
2,600,000	,,	,,	3⅜	light 3½ p.c. max.	86—88	..	3 19 7
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	105—108	..	3 14 1
4,193,975	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	82—84	..	3 11 5
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	93—98	..	5 2 0
82,500	,,	,,	6½	Do. do. 5 p.c.	114—117	..	5 11 1
70,000	10	Oct. 11	11	Hongkong & China, Ltd.	19—20	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental	179—182	..	4 7 11
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	52—94	..	3 14 6
195,242	Stk.	Aug. 29	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
£			p.c.				£ s. d.
551,000	Stk.	Feb. 27	10	Liverpool United A	218—220*	..	4 10 11
718,100	,,	,,	7	Do. B	161—163*	+½	4 5 11
306,083	,,	Dec. 30	4	Do. Deb. Stk.	106—108	..	3 14 1
152,736	Stk.	Feb. 13	7⅝	Maidstone 5 p.c.	135—141	..	5 8 2
75,000	5	Nov. 28	5	Malta & Medn., Ltd.	4¼—4⅝	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101—103	..	4 17 6
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	Nov. 14	3½	Monte Video, Ltd.	10½—11½	..	6 1 9
1,775,892	Stk.	Feb. 27	4⅝	Newc'tle & G'tesh'd Con.	106—107*	+¼	4 6 5
418,460	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	86—88	..	3 19 7
15,000	10	Feb. 27	10	North Middlesex 10 p.c.	19—20*	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	12½—13½	..	5 3 8
300,000	Stk.	Nov. 28	8	Oriental, Ltd.	140—143	..	5 11 11
60,000	5	Sept. 13	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	Oct. 30	7	Primitiva Ord.	6⅞—7⅛	..	4 16 7
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4⅝—5⅛	..	4 17 7
488,900	100	Dec. 2	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
1,000,000	10	Oct. 11	8	River Plate Ord.	13½—14	..	5 14 4
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 27	8	San Paulo, Ltd.	13—13½	..	5 18 6
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Sept. 13	10	Sheffield A	245—247	..	4 1 0
209,984	,,	,,	10	Do. B	245—247	..	4 1 0
523,500	,,	,,	10	Do. C	245—247	..	4 1 0
70,000	10	Nov. 14	10	South African	14½—15½	..	6 9 0
6,429,895	Stk.	Feb. 13	5⅛†	South Met., 4 p.c. Ord.	121—123	..	4 6 8
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	83—85	..	3 10 7
209,820	Stk	Sept. 13	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Feb. 27	5⅜†	S'th Suburb'n Ord, 5 p.c.	116—119*	+¾	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—121*	+½	4 2 8
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	Nov. 14	5	Southampton Ord.	107—112	..	4 9 3
120,000	Stk.	Feb. 27	6⅝	Tottenham A 5 p.c.	119—122*	+1⅝	5 10 8
398,940	,,	,,	5⅛	and B 3½ p.c.	100—103*	+⅜	5 1 11
149,470	,,	Dec. 13	4	Edmonton 4 p.c. Deb.	98—101	..	3 19 3
182,380	10	Dec. 30	8	Tuscan, Ltd.	10½—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
193,742	Stk.	Feb. 27	5	Tynemouth 5 p.c. max.	105—107*	+⅛	4 13 6
30,000	Stk.	Feb. 14	8	Wands- A 5 p.c.	—	..	—
255,636	,,	Feb. 13	6½	worth B 3½ p.c.	128—133	+3	4 17 9
75,000	,,	,,	5⅝	and C 3½ p.c.	—	..	—
80,075	,,	Dec. 30	3	Putney 3 p.c. Deb. Stk.	73—78	..	3 16 11
845,872	,,	Feb. 27	5⅛	West Ham 5 p.c. Ord.	101—104*	+¼	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	117—119*	+⅛	4 4 0
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the meeting of the Edinburgh and Leith Gas Commissioners on Monday, the Finance and Law Committee reported that they had had before them a memorandum by the Treasurer (Mr. John S. Gibb), in which it was stated that the capital indebtedness of the Commissioners was: For mortgages, £1,105,620; and for short fixed loans, £84,921—together, £1,190,541. He estimated that this would be increased at Whitsunday by the ordinary annual capital outlay of (say) £10,000—making in all £1,200,541. Of the mortgages, there fell to be repaid, renewed, or replaced, at Whitsunday £130,375; and if to this were added the £84,921, and the £10,000, there would be a total of £225,296 to be provided for at May 15 next. The Committee recommended that the Treasurer be empowered to accept mortgages for this sum, for three, five, or seven years, as opportunity might offer; and to supplement the mortgages, as might be found necessary, by short loans for a year or under, on the best terms obtainable. This was agreed to by the Commissioners. Mr. Herring then laid before the Commissioners a communication from the Gas Companies' Protection Association with reference to the Coal Miners' Eight Hours Bill, in which it was stated that the Association had resolved to strongly oppose the Bill, in the interests of gas-works; and it was asked whether the Commissioners approved of the intended opposition, and whether they were desirous of being represented in a proposed deputation to the Home Secretary. After a discussion, the Commissioners, by a majority of twelve to four, resolved that the communication be considered at their meeting on Friday.

The development of the mystery regarding the theft of a cash-box from the Dundee Corporation Gas Office was advanced a stage on Monday, when George T. Laburn, residing in Constitution Road, Dundee, a clerk in the office, was arrested by the city police. He was taken before a Magistrate, in private, and charged with the theft. It is reported that he denied the charge. Application was made for him to be liberated on bail; and this was allowed—the sum fixed being £25.

The unfortunate position in which the enterprising and highly-esteemed firm of Bruce Peebles and Company, Limited, is at present placed, has been much in evidence in this locality during the week. At the present time, the aim of the Directors is to have the business carried on; this, in their opinion, being the best policy in the interests of all concerned. But legal proceedings are slow, and there is danger that, if opposition to the wishes of the Directors be persisted in, the business will suffer, and the consequence will be that the goodwill will become a vanishing asset. It would be out of place here to venture an opinion upon the merits of the questions raised; but it is not out of place to say that the sagacity of the Lord President of the Court of Session—Lord Dunedin—in the matter cannot be rated too highly. His recognition of the importance of the questions raised was manifested by his offer, on Thursday, to hear Counsel upon the subject on Friday, a step which would have involved the stoppage of the hearing in another important case then in progress. The personal arrangements of Counsel prevented the offer being accepted; but it has been arranged that the case be put out for hearing upon the earliest day. While the liquidation is regrettable, it has been brought about, so far as can be discerned, not by anything which has taken place in connection with the gas department of the Company, but entirely through their misfortune in the electrical department, which they added to their business some years ago. The works of the gas department of the Company have continued to be at the Tay Works, Bonnington, in Leith; the electrical engineering works were erected at East Pilton. The failure has not been brought about by want of work. It is really to be found in the condition of the markets of the world, and the rise in the price of money.

Through the omission to take into account that there was an extra day in February this year, the mistake was unfortunately made of allowing both Districts of the Scottish Junior Gas Association to have engagements to-day. Dealing with that which was first in point of time—the visit of the Western District to the gas-works which are being erected at Kirkintilloch, I had formed the idea that what was being done was a reconstruction. It was a pleasant surprise therefore to find instead a brand new works, upon an entirely new site, almost ready for occupation. Of the old works, it may be said that it is a marvel how it was possible to produce gas in them fit for the service of the district. The purifiers, for instance, are mere toy boxes, and the getting of a passable gas supply through them must have entailed no end of labour. There is one thing about the works which is satisfactory—the plant in them is mostly of the best, and in good condition. But to counterbalance this state of things, there is no room for working. It is easy to understand what relief Mr. J. M'Leod, the Manager, and everyone concerned, will feel when they remove to the new works. The members of the Eastern District had before them a paper by Mr. R. B. Waddell, of Dunfermline, upon "Gas Heating for Domestic Purposes." Mr. Waddell is a very young man, and he pluckily came forward with a paper upon a subject to which it is apparent he has bestowed some attention. It was the means of bringing out a discussion of a more spontaneous nature than we are accustomed to, which is again, doubtless, due to the fact that heating by gas is receiving very wide consideration at the present time. If nothing very deep was contained in the paper, or in the remarks made in the course of the discussion, there was a great deal of interchange of thought, which, in respect that many have but limited means of obtaining experience in such matters, will be helpful. The members discussed the question of the use of oxide of iron for gas purification, which was crowded out of their meeting in January. Upon this subject the same remark may be made. There was a readiness to take part in the discussion which was gratifying. It speaks well for the feeling of association that exists when the members are found to be so ready to lay their difficulties and their successes before each other.

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"BLAND" Light is the KEY
To Gas EconomEE,
Likewise BrilliancEE,
Not forgetting EfficiencEE,
It's always SatisfactorEE,
And a Deadly Foe to ElectricitEE.

THE WINNER OF THE GOLD MEDAL

At the recent London and Paris Dress Exhibition held at Earl's Court, London, writes:

"I have great pleasure in telling you how very well satisfied I am with the very efficient way my Stand has been lighted with **BLAND** & Co.'s Incandescent Gas Burners, and generally acknowledged to be the **BEST LIGHTED IN THE EXHIBITION,** giving a perfect light and showing to perfection the delicate tints and colours of my beautiful display of Ostrich feathers, and for which I have the **GOLD MEDAL."**

Feb. 6, 1908. (Signed) C. E. MACRONE.

We shall be happy to reply to any enquiry respecting Church, Shop, Factory, or Domestic Lighting, and to prove by the many testimonials (which can be seen) the extraordinarily good results obtained in each of these departments by the **"BLAND" Light.**

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Telegrams: "BLANLITE, LONDON." "GASBURNERS, MANCHESTER."
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The controversy over the proposed gas transfer at Selkirk has been distinctly advanced a stage. In last week's "Notes," I mentioned the statement by Mr. S. Muir at the public meeting, to the effect that he had it on the authority of the Chairman of the Gas Company, and several other prominent men in the Company, that the Company were prepared to consider any agreement for the restriction of their dividend to 10 per cent. (which would be the continuation of a hitherto existing arrangement); and that the Town Council held a special meeting over this statement, and resolved to communicate with the Directors of the Company, asking them to say if such were the case, and if so what their proposal was. The Directors were communicated with, and replied that at this stage they were not prepared to consider any proposal to arrange a scheme for a restricted dividend; that they had put in writing what they were prepared to recommend the shareholders to accept; that they adhered to this; and that they did not see any reason for extending the time-limit for acceptance of their terms. This reply was considered at a special meeting of the Council on Thursday. Provost Sim moved that a poll of the ratepayers be now taken. They would require to give their reply to the Company's offer by March 14; and it would be well for the Council to have a few days in which to consider the situation. It was agreed to take a poll of the ratepayers on March 6, and that another meeting of the ratepayers to discuss the transfer scheme be held on the evening of the day preceding.

Water Supply for Bangkok.—According to a telegram received through Reuter's Agency, the King of Siam has sanctioned a scheme for providing Bangkok with a water supply, at a cost estimated at 3,000,000 ticals (about £187,500).

Reduction of the Assessment of the Enfield Gas-Works.—The assessment of the works of the Enfield Gas Company was recently raised by the Assessment Committee from £3000 to £6002. The Company appealed to the Committee, and Messrs. Ryde and Son and Messrs. W. A. Valon and Son acted on their behalf. The result was that they obtained a reduction to £4100.

Wilsons and Union Tube Company, Limited.—The Directors' report for the year 1907, states that the balance standing at the credit of the profit and loss account from the previous year was £575, to which there falls to be added the gross profit for the year, amounting to £14,627; making together £15,202. The Directors recommend payment of preference dividends for the three half years ending June 30, 1906, the first of which has been paid as an interim dividend, and the carrying forward of £2274.

Dearer Gas at Canterbury.—In the report which was adopted at the annual meeting of the Canterbury Gas and Water Company, the Directors remarked that the price of gas had been reduced by 2d. per 1000 cubic feet; but they regretted to say that this reduction could not be maintained, owing to the great increase in the cost of coal. The price, therefore, until otherwise announced, would be increased from 2s. 8d. to 2s. 10d. per 1000 cubic feet—a charge which, they pointed out, would bear favourable comparison with other inland towns.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

LIVERPOOL, *Feb.* 29.

There has been no new feature in the spot market upon which to comment. Production continues to be removed as it becomes available, and prices have been sustained, except at Leith, where they are a shade easier. The closing quotations are £11 17s. 6d. per ton f.o.b. Hull, £12 per ton f.o.b. Liverpool, and £12 1s. 3d. per ton f.o.b. Leith. In the forward position, there has been rather more interest, induced probably by a more conciliatory attitude on the part of makers. For delivery over the summer months, there are sellers at £12 to £12 2s. 6d. per ton f.o.b., according to port, and these prices would be accepted for delivery up to the end of the year. There has been some buying for near months at about the level of spot prices, but buyers are not very keen.

Nitrate of Soda.

This article is quiet but fairly steady at 11s. 1½d. per cwt. for 95 per cent., and 11s. 4½d. for refined quality.

Tar Products.

LONDON, *March* 2.

These are practically without change, and the markets are still quiet. Pitch is quiet but steadier than has been the case for some time past, owing no doubt to most of the manufacturers having disposed of what they were compelled to sell for near delivery. There is still, however, an absence of orders from the Continent. Creosote is steady in London and the Midlands, but dull in the North. Benzol, 90 per cent., is quiet. In the North, 8d. per gallon has been paid; while there are still sellers at 8¾d. in London. Benzol 50-90 per cent. and toluol are depressed. Solvent maintains its price with difficulty; there being few buyers. Carbolic is unchanged; and crystals are quiet. Refined naphthalene is unaltered in price; but creosote salts are a little easier than has been the case for some time past.

The average values during the week were: Tar, 12s. 6d. to 16s. 6d. *ex* works. Pitch, London, 20s. 6d. to 20s. 9d.; east coast, 19s. 6d. to 20s.; west coast, 19s. to 20s. f.a.s. Benzol, 90 per cent., casks included, London 8¾d., North 8d. to 8¼d.; 50-90 per cent., casks included, North 8d. to 8¼d., London 8¼d. to 8½d.. Toluol, casks included, North 8½d., London 9d. to 9¼d. Crude naphtha, in bulk, North 3½d. to 3¾d., London 3¾d. to 4d.; solvent naphtha, casks included, North 9d. to 9¼d., London 10¼d. to 10½d.; heavy naphtha, casks included, North 10d. to 10½d., London 11d. to 11½d. Creosote, in bulk, London 2 $\frac{9}{16}$d. to 2 $\frac{11}{16}$d.; North 2¼d. to 2½d. Heavy oils, in bulk, 2¾d. to 2¾d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6¾d. to 1s. 7d., west coast 1s. 6¼d. to 1s. 6½d. Naphthalene, £4 10s. to £9 10s.; salts, 40s., to 42s. 6d. packages included and f.o.b.

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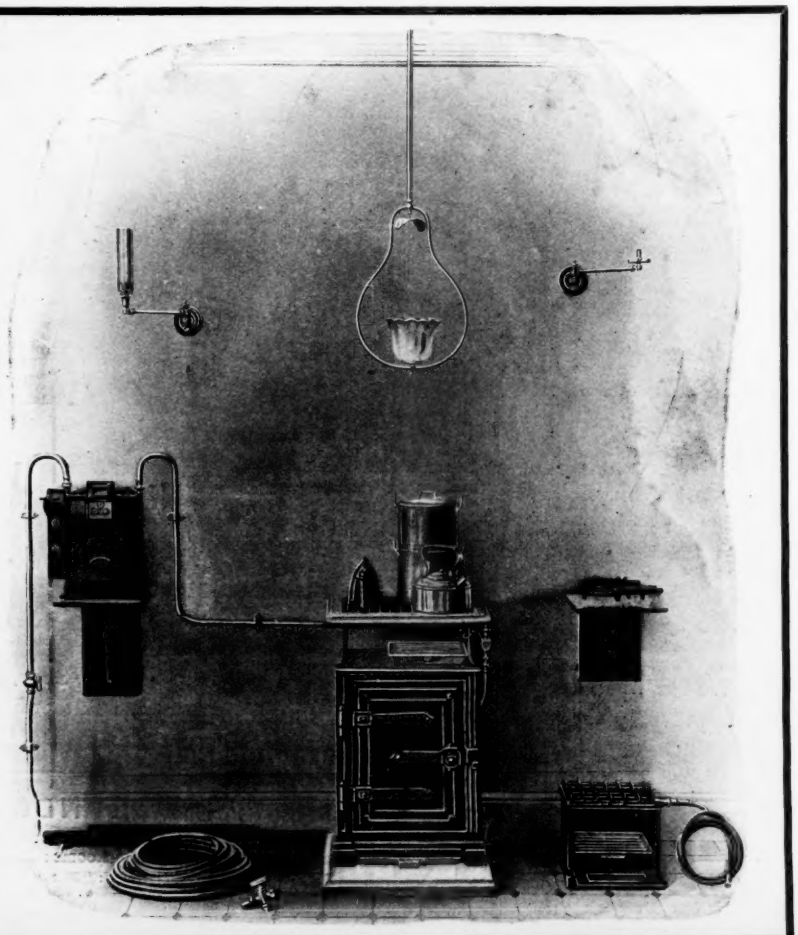

Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is steady. There appears to be a firmer tone in the market for near delivery, especially in London, where business is reported at good figures for first half March shipment. The London Gas Companies maintain their quotations for forward delivery; while ordinary makes have been sold at £12 upon f.a.s. London terms. In Hull, £11 18s. 9d. has been paid for good makes; and in Liverpool, £11 18s. 9d. to £12 is about the value. In Leith, £12 is reported to have been accepted at the beginning of the week by second-hand sellers; but the market closes at £12 to £12 2s. 6d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

While there is no actual change in the average quotations for coal, the feeling is towards a slight easement in prices generally. It is felt that with the very large profits which coalowners are regularly securing for their products, concessions might be made in some qualities. Colliery proprietors, on the other hand, view with apprehension the losses which will accrue to them from the passing of the Miners' Eight Hours Bill, and consider that it would be imprudent to disturb existing conditions. With regard to gas coal and cannel, the time is fast approaching for new contracts to be entered into. Colliery proprietors are expecting to be able to renew contracts on last year's terms. Coke for furnaces is a trifle cheaper; the consumption having decreased owing to the smaller output in metal. The trade in shipping coal continues very satisfactory.

Northern Coal Trade.

There has been a stronger inquiry for steam coals; but the lengthening days are lessening the consumption of gas qualities. Best Northumbrian steams are quoted from 12s. to 12s. 3d. per ton f.o.b. For second-class steams, the price is 11s., and for steam smalls about 6s. The collieries seem to be fully at work; and the output is well taken up for what is usually a quiet season of the year. In the gas coal trade, more of the great contracts have been settled, or are in course of negotiation. That for Stockholm is one of the most important, and is believed to have been allotted to two Durham collieries at about 16s. 6d. per ton delivered. A similar price is reported for the 35,000 tons of "special" Durham gas coals for Malmo. Some tenders for coal for Russia were sent in at the end of last week; but they do not include much gas coal. For current sales, the prices of Durham gas coal vary from 10s. to 11s., with the quotation for specials about 12s. 6d., f.o.b. It is probable that the Gefle and Horsens contracts may be settled next week at something like the current prices. The Stettin contract works out, after freight, at somewhere near 10s. 1½d. per ton, for second-class quality. As to the coke trade, it is steady; and gas coke shows little alteration. The current price for good gas coke is from 18s. to 19s. per ton f.o.b.

Scotch Coal Trade.

Quietness is still the characteristic of the market. There is not sufficient demand to take up the supply, and consequently there is great competition for orders. There has been a serious shrinkage in prices. Since the beginning of the year, ell and splint have fallen in price by fully 2s. 6d. per ton, and smaller sorts from 2s. to 3s. The prices quoted are: Ell 10s. 6d. to 11s. 9d. per ton f.o.b. Glasgow, splint 11s. 3d. to 11s. 6d., and steam 11s. 3d. to 11s. 6d. The shipments for the week amounted to 248,989 tons—an increase of 52,060 tons upon the preceding week, and of 36,838 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,605,765 tons—a decrease of 182,472 tons upon the corresponding period of 1907.

Warrenpoint Urban District Council and the Gas-Works.—A special meeting of the Warrenpoint Urban District Council was held last Tuesday to take into consideration the offer of the Gas Company to sell their works to the town. The meeting was held in private; but it is stated that there was considerable difference of opinion as to the advisability of purchasing the undertaking at the price asked, or, indeed, at any price. The question of electric lighting for Warrenpoint and district was under discussion; but it was eventually agreed not to come to any definite decision until the opinion of an expert had been obtained on the condition of the works.

Woking Water and Gas Company.—At the ordinary general meeting of this Company yesterday, the Directors in their report for the half year ended Dec. 31 stated that, after deducting expenses incurred in connection with the opposition to the extension of the borough of Guildford (£382), and writing off the balance of the suspense account (£150), the balance at the credit of the profit and loss account was £4884, out of which they recommended a dividend at the rate of 4½ per cent. per annum for the past six months; leaving £1287 to be carried forward. The Directors further stated that since the last report, they had procured a definite engagement on the part of the Guildford Corporation to pay, on the 25th inst., £46,900 awarded the Company, with interest thereon at 4 per cent. per annum from the date of the award until payment, less a sum to represent (while interest is payable) a proportion of the profits from the Company's water supply within the recent borough extension. The Company's mains within that extension will, on the awarded sum being paid, pass to the Corporation, who, on the other hand, bear the expense of laying substitutionary mains, which will become the property of the Company. During the half year, 165 additional house and 17 new meter connections were made, and the mains were extended by 2726 yards. The Engineers (Messrs. Joseph Quick and Son) reported that the works and plant were all in good order.

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Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards quickly obtained purchasers of two new issues of capital offered for sale by him under instructions from Directors. The first consisted of £5000 of 5 per cent. ordinary stock of the South Essex Water-Works Company, ranking with similar stock on which 4¾ per cent. per annum has lately been paid; and it fetched from £105 10s. to £106 per £100. The second comprised 400 additional £10 shares in the Lowestoft Water and Gas Company, ranking for 7 per cent. dividend, but carrying 5¼ per cent., which were sold at from £11 5s. to £11 7s. 6d. each; and £1000 of 4 per cent. perpetual debenture stock of the same Company, which realized from £105 to £105 10s. per £100. Some days ago, 30 £20 shares in the Gravesend and Milton Water Company were sold by auction by Messrs. Spain and Son. The shares were offered in six lots, the first of which realized £65 per share, and the remainder £64 per share. At a recent auction sale at Lincoln, Mr. D. M. Bell sold four £10 shares (fully paid) in the Market Rasen Water Company at £15 apiece. A few £5 shares (fully-paid) in the Skegness Gas Company were disposed of at £6 each.

The Parish Council of Chinley have applied to the Local Government Board for their sanction to erect a small gas-works and plant for the supply of gas for public lighting and the requirements of the inhabitants. They object to be supplied from outside the parish, and point out the continued growth of Chinley, which has a rateable value of nearly £16,000. The railway station is at present lit by oil-lamps.

A remarkable case has recently come to an end in Germany, where a suit has been settled after 478 years of constant litigation. The cause of the law suit was the action of certain mill owners in raising without authorization the height of a dam in the River Nesse (which runs through the town of Gotha) in order to increase the supply of water to their mills; and the local authority sought to restrain their action by injunction.

Some improvements and additions to their existing water scheme, involving an outlay of £5000, are announced by the Queenstown (Cape Colony) Town Council. It is estimated that 362 tons of cast-iron pipes, costing £3113, will be used, and that £393 for valves and specials and £220 for sheet lead will be expended. Candy's polarite filters (estimated to cost £1150 each when erected) are to be installed in connection with the high levels.

An example of how gas companies and their contractors get fleeced was before the Gosport County Bench last Tuesday. The Company's Engineer was recently passing through one of the streets, when he saw the contractor's carman (Arthur Tee) leave a house with an empty bag; a load of coke then standing in the roadway. There was no order at the works for delivery of coke in the street; and a shortage in the coke load was subsequently found. Tee was convicted of converting 63 lbs. of coke, of the value of 8d., to his own use, and was fined 20s.

The Norwich employees of the British Gaslight Company held their second annual dinner recently, when a gathering of 115 was presided over by Mr. Thomas Glover (the Manager of the works), who was supported by Mr. W. H. Wayte (District Superintendent), and Mr. F. Balls (Chief Collector). Afterwards there was an excellent smoking concert. During the evening one or two toasts were pledged; and the Chairman distributed a number of bonuses, accorded to the most efficient workers engaged in different departments. He explained that the object of the bonus scheme was to encourage as high an efficiency as possible, and to induce the workers to promote the interests of the Company generally. It represented a bond of mutual interest between the Company and the workers. On handing the recipients their various sums, Mr. Glover cordially referred to their good services. Mr. Wayte submitted the health of "The British Gaslight Company," and said all present ought to feel proud of the Company they served. It was controlled by a Board of Directors who had proved that they knew how to treat their officials and the whole of their employees. The toast was heartily received; and Mr. Glover, responding on behalf of the Company, said he was proud to have such excellent workers under him. He thought there would be little socialistic agitation if all men worked under companies who had the interest of their employees at heart. For a very long time the Company had provided for their old servants after they had done good and loyal service. On their wages book they had a long list of old men who were receiving pensions after having served the Company faithfully and efficiently. The health of the Chairman was subsequently cordially honoured.

The Directors and staff of the Ilford Gas Company held their annual dinner at the Angel Hotel, Ilford, last Thursday week. Owing to the unavoidable absence of Mr. W. Ashmole, the Chairman of the Company, the chair was taken by Mr. J. W. F. Mumford, one of the Directors. He was supported by Messrs. H. A. Bishop, T. J. King, and R. A. Harris (Directors), Mr. H. W. Ashmole (the Secretary) Mr. W. B. Farquhar (the Engineer), Mr. T. F. Canning (the Assistant Engineer), and Mr. J. K. Iorns (Collector). Members of the staff to the number of about forty were present. The toast of "The Ilford Gas Company" was proposed by Mr. Bishop, who said he had been connected with the Company for many years. Mr. Farquhar said his duty was a pleasant one—to propose the health of the Chairman of the evening. Mr. Ashmole was to have occupied the chair that night, but they had a very good deputy in Mr. Mumford. Mr. Mumford, in reply, said the Company wanted young men, and their staff comprised a lot of young men with much energy and "go" in them. Good progress had been made at Ilford, and several prizes had come to their staff. Mr. J. H. Brown, the late Engineer, had now a very prominent position in the industry. This gentleman had been followed by Mr. A. A. Johnston, who had been appointed Chief Engineer to the Brentford Gas Company, and a most responsible position. He was sure they had a most loyal staff. Mr. Iorns proposed the health of the Engineer and Manager, and said they were all glad the Directors had seen their way to appoint Mr. Farquhar to the position of chief—thus following the case of Mr. Johnston's promotion from assistant to chief when Mr. Brown went to Nottingham. He thought it an excellent course, which afforded encouragement to others, who would feel that, as occasion arose, their turn would come. Mr. Farquhar said he felt from his heart their kind remarks, and much appreciated the way they had received him.

SEASON 1908.

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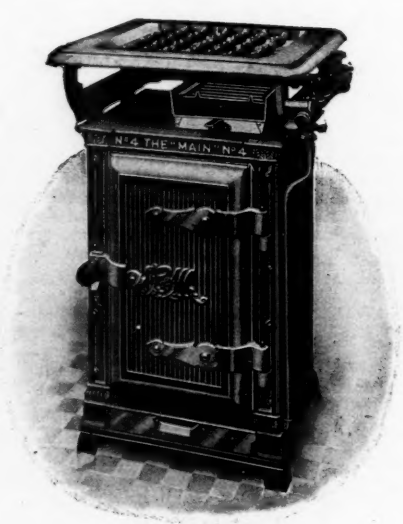

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